

## CHAPTER XI

### OPERATIONS AND MAINTENANCE

The Operations and Maintenance Program of the Naval Facilities Engineering Command covered tasks formerly grouped under the title of Public Works Management functions.<sup>1</sup> In recent years, the term "facilities management functions" has been used to designate these tasks. Facilities management functions included the maintenance, alteration, repair, overhaul, and disposal of land and improvements (Class I and II Property); the procurement and production of utilities and the operation of utilities distribution systems; the operation and maintenance of construction, weight handling, and automotive and railway transportation equipment, and the provision of public works engineering and other services.

The public works engineering and other services included such things as insect and rodent control, janitorial services, refuse collection, and equipment installation. The phrase "facilities management" has also been used generally to refer to the total facilities life-cycle from planning to disposal. This was the sense in which the Dillon study used the term. The narrow use of "facilities management" correlates roughly with the name change from Bureau of Yards and Docks to Naval Facilities Engineering Command in 1966.

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<sup>1</sup>In fact, the Operations and Maintenance Program was originally called the "Public Works Management Program." BUDOCKS and CEC Precepts (Nov. 1961), pp. 33-34.

In short, facilities management dealt with the essential if unglamorous job of keeping the Navy's shore facilities in good physical condition and providing related services, notably in the fields of utilities and transportation.<sup>2</sup>

Facilities management in the years 1965 through 1974 was characterized by innovation and achievement, but also by travail and frustration. The story of these years begins with a discussion of the Naval Facilities Engineering Command's role as single executive for facilities management and the management changes which accompanied the end of the single executive assignment.

Between 1965 and 1974, the Command's Operations and Maintenance Program also had to deal with the tremendous demands of the Vietnam War. United States involvement in this conflict put a heavy strain on program planning, especially in the maintenance area. Following the American withdrawal from the war there was no relief, no period of recuperation. Drastic funding cutbacks in the late 1960s and early 1970s made it difficult for the Command to stabilize its facilities management function. The postwar period also brought new problems with which facilities management had to deal, often with insufficient funding. It has only been within the last two years that facilities management has begun to recover from the trauma of the Vietnam era and to forge ahead.

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<sup>2</sup>

OPNAV Instruction 11010.23B of 2 Jan 1969, p. 2.

Before approaching facilities management planning and programming, we shall first deal with an important management experiment which was carried out during the mid-1960s -- the single executive concept.

#### SINGLE EXECUTIVE ASSIGNMENT

The Naval Facilities Engineering Command served as the Navy's single executive for facilities management for four years, beginning in July 1963. This assignment came about as the direct result of a recommendation made in the well-known Dillon study of Navy management.<sup>3</sup> The Dillon study identified and analyzed serious weakness in the way the Navy took care of its physical plant ashore. It concluded that the remedy lay in concentrating previously dispersed facilities management responsibilities in a single agency -- the then Bureau of Yards and Docks.<sup>4</sup> With acceptance of this recommendation by the Secretary of the Navy,<sup>5</sup> the single executive experiment began.

Previously, the Bureau of Yards and Docks had exercised direction in this area -- developing management systems and

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<sup>3</sup>Recommendation No. 76. Review of Management of the Department of the Navy, Vol 1, NAVEXOS P-2426B (15 Dec 1962), p. 127. Hereafter, Dillon Study, I.

<sup>4</sup>Dillon Study, I, pp. 123-129; Dillon Study, Vol II, Study 6 (26 Oct 1962), pp. 27-50.

<sup>5</sup>SECNAV Notice 5430 of 1 Apr as cited in BUDOCKS Notice 7110 of 17 Jun 1963. The transfer of functions took place in two phases, beginning on 1 Jul 1963 and 1 Jul 1964 respectively.



procedures, setting standards and establishing criteria -- but it had no power to enforce its writ. Ten different management agencies controlled maintenance funds.

They utilized improved management techniques only as they saw fit and showed a wide variation in degree of attention to and interest in facilities upkeep. The shore plant differed as a result.<sup>6</sup> Under the single executive concept, on the other hand, all funds flowed through just one agency, which therefore had the power to establish a uniform and coherent Navy-wide approach aimed at correcting existing deficiencies in the management of plant up-<sup>7</sup>keep and operation.

The single executive designation represented a very significant increase in authority and responsibility for the Naval Facilities Engineering Command. Spokesman for the Command viewed it both as a recognition for past achievements and as a challenge and an opportunity for the future. The Dillon study recommendation

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<sup>6</sup> Dillon Study, II, 6, pp. 28, 45-46 and passim.

<sup>7</sup> The Dillon Study made it very clear that centralized "control" must replace mere "direction." Ibid., pp. 127-128, p. 46; Stated in its most succinct form, the object was to establish "system discipline" in facilities management. According to a Naval Facilities Engineering Command spokesman such discipline could only be exercised by "one executive...having control of the funds and the management reports." CDR L. G. Timberlake, "Single Executive/DOD Resources Management System," NAVFAC and EFD Maintenance Conference (13-16 Sep 1966), p. 219.



rested upon recognition of the competence with which the Command<sup>8</sup>  
had carried out its previous duties of technical direction.

The challenge lay in the magnitude of the job confronted,  
the lack of unanimous and wholehearted acceptance of the Command's  
new role by other elements of the Navy, and the necessity for demon-  
strating managerial skill to go with the Command's already proven<sup>9</sup>  
technical excellence. Implicit in this challenge was the oppor-  
tunity to enhance the prestige and the image of the Command and  
the Civil Engineer Corps while contributing to the solution of an<sup>10</sup>  
important Navy problem.

How did the Command deal with its new responsibility? How  
well did it meet the challenge and capitalize upon the opportunity?  
The answer to these questions lies in a point comparison between  
the analysis and prognosis made by the Dillon study on the one

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<sup>8</sup>"During the early and mid-1960s the entire process of  
operation and maintenance of facilities has moved toward a  
pattern of progressive improvement of technical competence throughout  
the Department of the Navy..." Dillon Study, II, 6, p. 27; RADM  
Corradi spoke of the single executive assignment as an "expression  
of confidence." Chief's Annual Conference (13-17 May 1963).

<sup>9</sup>Ibid; Timberlake, "Single Executive...System," pp. 219-222;  
CDR F. E. Lennox "What's New in Maintenance Management," Bureau/  
FEO Code 60 Conference (Jan 1965), pp. 3-5.

<sup>10</sup>Ibid; RADM N. J. Drustrup, "Greeting from the Deputy Chief,"  
Chief's Annual Conference (13-17 May 1963).

hand and the actual accomplishments of the single executive on  
the other.<sup>11</sup>

(1) The Dillon study found a serious lack of uniformity within the Navy in the application of maintenance management techniques and in support of controlled maintenance programs. Beginning in the 1950s, the Bureau of Yards and Docks as technical director had instituted and constantly improved a number of such techniques and programs with very promising results in terms of effectiveness and economy.<sup>12</sup> Responsibility for execution of these programs, however, was dispersed among ten different management agencies. Some took the responsibility very seriously while others shirked it. As a result, the programs lagged and little more than half the potential benefits actually materialized. To remedy this situation mere technical direction would no longer suffice, the study concluded, adding that only centralized control of both personnel and funds would permit achievement of the best maintenance management.<sup>13</sup>

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<sup>11</sup> Such a comparison was undertaken in a draft brochure --- never released --- prepared in Code 10 and tentatively titled "Single Executive for Facilities Management Termination Report" (hereafter cited as "Single Executive Report"); The Navy auditor used a similar approach in Audit Report No. N-2-65 dated 11 Mar 1966, as did J. U. Saum, "Single Executive Responsibility for Real Property Maintenance and Utilities Operation," Navy Management Review (Jun-Jul 1965), pp. 16-18.

<sup>12</sup> Dillon Study, II, 6, pp. 32-35. For a brief discussion of the maintenance management system, see Lennox, "What's New in Maintenance Management."

<sup>13</sup> Dillon Study, II, 6, pp. 34-36.

This expectation that centralized control would lead to improved execution of maintenance management procedures proved well-founded (even though the single executive controlled only funds and not, as the study suggested, personnel as well). Shore activities, spurred by vigorous action from the Naval Facilities Engineering Command's field divisions and realizing that henceforth assiduity in the performance of maintenance management functions would be a factor in decisions concerning the allocation of resources, performed those actions with renewed vigor.<sup>14</sup> An independent audit conducted in 1965, after two years of single executive operation, discovered a perceptible improvement in the physical quality of maintenance in the sample of activities it surveyed.<sup>15</sup>

The improved quality of maintenance reflected not merely increased emphasis upon the execution of existing procedures and techniques but also the development of new ones. A work input control system provided improved maintenance workload planning at the activity level. Skilled Management Assistance Teams from the various engineering field divisions visited activities to aid them in understanding and executing the maintenance program. A Model Public Works Department Program offered the incentive of recognition for excellence in performance of maintenance management

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<sup>14</sup> Saum, "Single Executive Responsibility," p. 18; Naval Area Audit Service, Audit Report No. N-2-65, p. 4.

<sup>15</sup> Ibid., pp. 4, 6.



at the local level. Development of engineered targets for utilities and transportation performance and of standard automotive repair/replacement criteria facilitated the maintenance effort in those functional areas.<sup>16</sup>

(2) The Dillon study found that the Navy had no satisfactory means for determining the resources needed for facilities operation and maintenance nor for distributing available resources economically and uniformly in accordance with relative need.<sup>17</sup> This, of course, meant relative over-funding for some activities, relative underfunding for others -- and such imbalance tended to be self-sustaining in the absence of valid means for determining need and distributing resources accordingly.

To deal with the problems of accurate and uniform determination of maintenance needs, the Naval Facilities Engineering Command as single executive worked toward and eventually achieved a "zero base budget concept" in place of the "historical" method, which merely perpetuated existing inequities. In other words, instead of an across the board percentage markup from previous years, the maintenance needs of each activity were figured annually from scratch, based on the actual existing situation as determined by

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<sup>16</sup>"Single Executive Report," p. 7; Saum, "Single Executive Responsibility."

<sup>17</sup>Dillon Study, II, 6, pp. 36-37; Ibid., I, pp. 123-129.

by an engineering formula. The formula took into account the quantity of facilities to be maintained, unit costs, geographical wage differentials and the condition of the facilities as measured by maintenance backlog.<sup>18</sup>

Accurate determination of needs paved the way for a more equitable distribution of available maintenance funds. On the basis of the data developed concerning needs, the Command prepared rationales which guided its Engineering Field Divisions in the distribution of funds to the activities in their respective areas. The field divisions, in their new role of middle management, had a considerable degree of flexibility in making adjustments to fit local conditions, adding another element of increased realism to the fund distribution process.<sup>19</sup>

Spokesmen for the Command expressed the belief that under the single executive the determination of needs and the distribution of resources improved substantially.<sup>20</sup>

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<sup>18</sup>"Single Executive Report," pp. 8-9; Saum, "Single Executive Responsibility," pp. 17-18; Memo from NAVFAC Hqs Code 101 to Code 10C of 23 Jun 1966; Memo from NAVFAC Hqs Code 10 to Code 9 of 3 Jul 1967. In addition to this formula for recurring maintenance, a formula for figuring activities major repair needs was also developed.

<sup>19</sup>"Presentation by CAPT N. M. Martinsen, CEC, USN," Chief's Annual Conference (2 May 1966), pp. 6-7; Memo from NAVFAC Hqs Code 101 to Code 10C, 23 Jun 1966.

<sup>20</sup>"Martinsen Presentation," pp. 6-7; "Single Executive Report," pp. 8-9; Memo from NAVFAC Hqs Code 101 to Code 10C of 23 Jun 1966.

The Navy auditor agreed that the single executive had indeed achieved a more equitable distribution of resources according to proven need.<sup>21</sup>

(3) By implication at least, the Dillon study suggested that the single executive would further the cause of consolidating public works (facilities management) functions in naval complexes.<sup>22</sup> The study recognized that although policy at the highest level favored it, consolidation remained a matter of controversy within the Navy. The study also found that existing consolidations had produced the expected economies whereas it could find no definitive evidence to support critics of consolidation. It therefore recommended full and effective implementation of existing policy along with the retaining and extending of the economies already realized by consolidating public works functions.<sup>23</sup>

As single executive, the Naval Facilities Engineering Command undertook to carry out this recommendation. Under its aegis three

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<sup>21</sup>Audit Report N-2-65, pp. 4, 6.

<sup>22</sup>The study included consolidation under the heading of "improved public works management techniques" which the single executive was expected to advance. Dillon Study, II, 6, p. 32. The consolidation principle called for combining into one organization the provision for facilities management functions at contiguous naval activities. The two major forms of consolidation are the lead activity, in which the public works department of a larger activity performs these functions for its smaller neighbors, and the Public Works Center, a separate activity created specifically to perform the functions for all the other activities in a large complex, on a reimbursable basis. Ibid., p. 28

<sup>23</sup>Ibid., pp. 28-32.



new Public Works Centers were created (1 July 1965) along with several new lead activities and numerous partial consolidations.<sup>24</sup> In addition, the Command carried out studies of other possible consolidations and it developed standard criteria for determining when and where additional public Works Centers should be established. It also developed improved and standardized techniques for setting up new Public Works Centers and for the organizations and operation of the centers.<sup>25</sup>

On the negative side, the opposition to consolidation noted by the Dillon study showed little sign of abating. After 1966 the creation of new Public Works Centers came to a complete halt<sup>26</sup> and to some extent proponents of consolidation actually found themselves on the defensive.<sup>27</sup> As 1967 came to a close, the future

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<sup>24</sup>"Single Executive Report," pp. 5-6; "Martinsen Presentation," pp. 22-23. By the end of fiscal year 1966, the total number of consolidations had quadrupled. The three new Public Works Centers were those at Great Lakes, Pensacola, and Yokosuka. This was a sizable increase since on 1 Jul 1963 only seven of the centers existed.

<sup>25</sup>J. C. Law, "Uniform Procedures for Public Works Centers," Navy Management Review (Apr 1966), pp. 8-9; "Martinsen Presentation," pp. 23-25.

<sup>26</sup>Ground was actually lost when the Public Works Centers located at Guantanamo Bay and Newport were disestablished on 1 Jul 1971 and 30 Jun 1974 respectively. The only new Public Works Center established since 1966, was the one established at San Francisco on 1 Jul 1974. See below for more information.

<sup>27</sup>For example, consolidation at the Treasure Island Public Works Transportation Center remained incomplete because of resistance to full consolidations. Memo from COMNAVFAC to CNM and DCNO (LOG) of 16 Jan 1968; Questioning of PWC charges continued as it had at the time of the Dillon Study (which had dismissed it) leading to a published reply by Code 10. CAPT Joseph E. Powell, "Utilities Charges in Areas Served by Public Works Centers," CEC Biweekly Report (15 Oct 1968).

of public works consolidation remained obscure. But with or without the single executive designation the Naval Facilities Engineering Command continued as the Navy's chief proponent of public works consolidation.

(4) The Dillon study focused upon chronic inadequacy of maintenance funds and a consequent deterioration of plant, as measured by a high and continuously growing level of maintenance backlog, as a crucial problem area.<sup>28</sup> The study asserted that, in addition to increasing efficiency in the use of such funds as were available, the single executive would enhance "the effectiveness of justifying and obtaining maintenance funds from the Congress..."<sup>29</sup>

As single executive the Naval Facilities Engineering Command made strenuous efforts to combat the effects of inadequate funding and reduce the maintenance backlog. Their efforts included reprogramming into facilities maintenance functions the savings generated by increased efficiency in other facilities management areas --- chiefly utilities and transportation operations. Some \$41 million was thus reprogrammed in a three-year period.<sup>30</sup> But rather

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<sup>28</sup> Maintenance backlogs will be discussed in more detail below.

<sup>29</sup> Dillon Study, II, 6, pp. 39-41; Ibid., I, 125-126.

<sup>30</sup> Memo from COMNAVFAC to CNM of 17 Jun 1966; "Martinsen Presentation," p. 18; "Single Executive Report," pp. 10-11. The latter shows that for each fiscal year from 1964 through 1967 funds actually obligated for maintenance obligation substantially exceeded the amounts authorized and appropriated for the maintenance floor.



than reducing backlog, this largely served as the Dillon study had foreseen, merely to offset the effects of price and wage escalation and the added costs of maintaining an enlarged and progressively<sup>31</sup> older total facilities inventory. Beginning in 1965, unprogrammed costs of operations in Southeast Asia siphoned off a large part of<sup>32</sup> the savings due to increased efficiency. These tended, in any case, to be one-time savings only, since there was a tendency for the<sup>33</sup> total budget to shrink by the amount of previous years savings. In short, increased efficiency and reprogramming helped reduce the rate of backlog growth which would otherwise have obtained, but they could not, by themselves, bring about a reduction in backlog.<sup>34</sup>

Improvement in overall facilities condition, then, depended upon a substantial increase in the total amount of funds available.

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<sup>31</sup>By a conservative estimate, the annual cost increase due to the combined effect of price escalation, greater maintenance costs and accelerated deterioration due to postponing needed repairs came to something like six percent. "Single Executive Report," p. 10; cf. "Martinsen Presentation," p. 9, which states that at existing funding levels (1966) "we cannot offset increasing plant, cost of doing business and costs of deferred maintenance;" For the Dillon study anticipation of this development, see Dillon Study, II, 6, p. 41.

<sup>32</sup>"Martinsen Presentation," pp. 7, 12.

<sup>33</sup>This is demonstrated schematically in an undated briefing from Code 10 (apparently prepared around the beginning of 1967) headed "Talking Paper."

<sup>34</sup>This is illustrated graphically in "Single Executive Report," p. 11.



The Naval Facilities Engineering Command as single executive strove to obtain such an increase. It prepared and submitted annual program change requests and sought to find all possible means of increasing maintenance funding.<sup>35</sup> To strengthen the justification for dollar increases, the Command developed and secured considerable acceptance for an objective and uniform measure of plant condition - one based on the ratio between unfunded facilities deficiencies and current plant replacement value. It also secured acceptance for a criterion of satisfactory plant condition, in terms of this index, as a goal toward which to work.<sup>36</sup>

These efforts produced only a minimal degree of progress in overcoming the funding deficiency. Funding remained relatively level and the backlog grew apace.<sup>37</sup> While hostilities continued in

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<sup>35</sup> Memo from COMNAVFAC to CNM of 17 Jun 1966 both describes and illustrates the nature and intensity of the quest for funds. In addition to the program change requests seeking additional dollars at the DOD level, NAVFAC desperately sought them within the Naval Material Command and by reprogramming within overall Navy O&MN funds. Ibid.; cf. Ltr from CNO to COMNAVFAC of 2 Nov 1966, reprinted in the CEC Biweekly Report (15 Nov 1966).

<sup>36</sup> The goal, accepted by the Secretaries of Defense and of the Navy, was to reduce backlog to .25 of one percent of current plant replacement value and to hold it at this figure. See the PCR of 22 Aug 1967; Memo from NAVFAC Hqs Code 01 to Code 10 of 23 Nov 1966; "Single Executive Report," p. 9.

<sup>37</sup> In four years under the single executive, the portion of O&MN funds appropriated for facilities maintenance functions (the maintenance floor) rose only from \$134.5 million to \$142.7 million (as indicated above, more was actually spent on these functions because of reprogramming). In the same period, the backlog of essential maintenance fundable from O&MN rose from \$126.4 million to \$145.0 million. Allowance should be made in both sets of figures for an approximately 3% annual price inflation, "Single Executive Report," p. 10; "Martinsen Presentation," pp. 8-9.

Vietnam and an overall stringency in Navy finances existed, the long-term needs of shore facility upkeep faced seemingly insuperable obstacles in the competition for scarce dollars. In this very important area, therefore, the expectations of the Dillon study largely fell short of fulfillment.

Did this failure indicate some flaw in the single executive concept or practice? The Navy auditor in 1965 suggested that in part the lack of success in obtaining more funds reflected weakness in fund request justifications because of Department of Defense skepticism concerning the validity of the Naval Facilities Engineering Command's techniques for identifying backlog and measuring plant condition. But at that very same time, the Command's techniques

for validating backlog were receiving a solid endorsement from the Defense Department. Subsequently, as shown above, one of the

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<sup>38</sup> MIC Problem Write-up, Program IX (Jan 1969); Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967; COMNAVFAC memo of 30 Jan 1968 all allude to the inability of facilities management functions to compete successfully for dollars during an era of open warfare and new weapon systems development.

<sup>39</sup> Audit Report No. N - 2 - 65 of 11 Mar 1966, pp. 4-6, 9-10. The audit conclusion appears somewhat questionable on its face since the report conceded that many factors contributed to the fund deficiency but then considered just one of them -- in complete isolation from all the others; BUDOCK's reply concurred generally in the conclusion but pointed to corrective effort then underway. Ltr from CHBUDOCKS to Director, Naval Area Audit Service of 25 Apr 1966.

<sup>40</sup> An OSD sponsored field study verified some 95% of backlog projects investigated and concluded that "the Navy BEMAR Program is well managed and represents essential requirements." Remarks of CDR F. W. Day, memo for the record, Real Property Maintenance Council Meeting, 8 Jul 1965; cf: the CEC Biweekly Report (9 Jun and 2 Nov 1965).



Command's approaches to measuring facilities condition and the backlog reduction goal derived from it was accepted by the Secretary<sup>41</sup> of Defense. The failure to increase funding substantially and thereby reduce backlog therefore appears primarily due to factors beyond the control of the Naval Facilities Engineering Command -- the Vietnam war and the competing demands of weapon systems development in a climate of fiscal austerity -- and not to any fault in the theory or the execution of the single executive assignment.

(5) Finally, the Dillon study noted weaknesses in the field<sup>42</sup> of facilities management budgeting and management information. These weaknesses were closely related to the other problems exposed and analyzed by the study. Specifically, the study found that the budgeting process was neither integrated with the overall management effort nor tailored to fit the needs of the latter. Budgets couched in almost purely fiscal terms failed to develop or to use

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<sup>41</sup>See note 34 above. The Logistics Management Institute accepted NAVFAC's approach of using current plant value as a key index, but "OSD has not formally adopted or accepted its usage in planning (FYDP) or annual budget determinations." Memo from NAVFAC Hqs Code 10 to Code 9 of 3 Jul 1967. (Emphasis added.) In other words, DOD acceptance of NAVFAC approach had not attained binding formal status.

<sup>42</sup>The Dillon study also discussed weakness in direction and coordination of facilities management functions and lack of a rational facilities replacement policy. The very act of appointing the single executive went a long way toward dealing with the former weakness. NAVFAC worked out programs for dealing with replacement policy in the transportation and utility fields; the job of rationalizing replacement policy for fixed structures fall more properly in the province of the Shore Facilities Planning and Programming System.



the kinds of data needed for accurate determination of maintenance needs, for equitable distribution of resources, for supporting and justifying fund requests, and for realistic appraisal of program execution. The study therefore, in its recommendation number 77, called upon the single executive to develop a "management oriented budget and information system" to correct this failure.<sup>43</sup>

By fiscal year 1967 the Naval Facilities Engineering Command had such a system in operation.<sup>44</sup> The system meshed the budgeting process with the control of facilities maintenance and operations in a complete management cycle of planning, execution, and appraisal. A brief schematic description will show how the system responded to the guidelines set forth in the Dillon study:

(1) Planning. The facilities management budget process began, some eighteen months before the start of the fiscal year to which the budget pertained, with the submission of budget estimates by each shore activity. As described above, the Naval Facilities Engineering Command applied to these data the engineering formulas that it

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<sup>43</sup> Dillon Study, II, 6, pp. 36-39; I, pp. 129-130.

<sup>44</sup> Actually, no real starting date can be set for the beginning of the system, since it represented a gradual implementation by numerous related actions of a conceptual approach established at the beginning of the single executive period. The conceptual framework, as of that time, is set forth by CDR C. E. Diehl, "Management Oriented Budget and Information System," Chief's Annual Conference (13-17 May 1963).

had developed to determine maintenance needs accurately and to allocate resources equitably. It incorporated decisions on resource allocation in an Annual Planning Figure for each activity. The Commands fourteen Engineering Field Divisions injected a further element of realism into the process by adjusting these planning figures, in the light of their intimate knowledge of local conditions, for activities within their respective geographic jurisdictions. The Annual Planning Figure then served as the basis for an operating plan prepared by the activity. When approved, this operating plan became in effect both the annual budget for the public works department of the activity and a physical plan for the accomplishment of facilities management functions during the year. This provided at the most basic level, the interaction between budgeting and facilities management which the Dillon study had in view.

(2) Execution. Execution of the operating plan by the activity proceeded in accordance with the management systems and procedures developed by the Bureau of Yards and Docks in the years before the single executive assignment. There seemed less need for innovation in this phase than in the planning and appraisal phases, because of the adequacy of existing arrangements. Some strengthening of level planning and control did occur through implementation of the Work Input Control System; also such existing programs as the use of Engineered Performance Standards and Work Improvement received added attention.



(3) Appraisal. During the course of execution, activities submitted reports developed by the single executive - a series of functional cost analysis reports and a public works control summary - designed to permit realistic evaluation of the way in which work was performed and plans were fulfilled. The reports incorporated various newly developed management indicators so that all levels of management could check performance against plan not only in budgetary terms but also in terms of performance against both fiscal and non-fiscal standards, ranges, and targets. Variations from plan or from pre-set standards and norms highlighted problem areas so that corrective action could be taken as needed.

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Evaluation of the single executive's response to Recommendation Number 77 presents difficulties since the management oriented budget and information system it developed was not a newly-created and discrete package with a precise beginning date, but rather a gradually evolving elaboration of existing practices and systems. Moreover, at the time the single executive assignment ended, the system was still in a developmental stage, subject to constant modification and improvement in the light of unfolding experience. Spokesmen for the Naval Facilities Engineering Command regarded the system with considerable pride, as evidenced by Rear Admiral

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<sup>45</sup> Good summary accounts of the system can be found in CDR P. S. Birnbaum, "Program 9, Operations and Maintenance," Type-script briefing (27 Sep 1966); Public Works Management Improvements, NAVFAC P-99, Change 1 (Jan 1967), pp. 1-5; CDR R. E. Dickman, "What's New in Resources Management," Bureau - FEO Code 60 Conference (18-22 Jan 1965); J. H. Heckathorn, "Financial Aspects of Maintenance," NAVFAC and EFD Maintenance Conference Final Report (13-16 Sep 1966), pp. 23-34.



Husband's statement of his firm belief that "the NAVFAC management ,  
system represents the most advanced sophisticated method for managing  
facilities within the Defense Department".<sup>46</sup>

In fiscal year 1967, a major Navy reorganization brought the  
use of the single executive concept to an end. As a result the  
Commander, Naval Facilities Engineering Command, relinquished his  
responsibility as the Navy-wide manager for facilities maintenance.  
The explanation for this drastic policy change was as follows:

"In order to conform to the concept of a unilinear  
Navy and to adapt to the requirements of the Depart-  
ment of Defense Resources Management Systems it  
now becomes necessary for resources budgeted for  
facilities management functions to appear in  
activity Expense Operating Budgets...and to be  
transmitted to activities via their chains of  
command."<sup>47</sup>

The detailed preparation of budgets and the direct control  
of resources for facilities management functions was to be exercised  
by the commanding officers of activities and their seniors "in  
conjunction with the Naval Facilities Engineering Command and its  
field organizations."<sup>48</sup>

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<sup>46</sup> Memo from COMNAVFAC to ASN (I&L) of 22 Nov 1966.

<sup>47</sup> OPNAV Instruction 11010.23 of 16 May 1967.

<sup>48</sup> Ibid.

Under the new system, budget estimates were prepared by activities with the assistance of the Engineering Field Divisions. These were sent through the chain of command to the Chief of Naval Operations (with a copy to the Navy Facilities Engineering Command via the Engineering Field Divisions) for review and use in preparing the Navy's total facilities management budget in Washington. When the funding levels of the four categories were set and consolidated in the Presidential Budget, the Command transmitted the planning figures for the coming fiscal year to the activities with a copy to major claimants in January or February. Expense Operating Plans (EOPs) based on these planning figures were then developed by the activities with the assistance of the Engineering Field Divisions. The Expense Operating Plans then went to the Chief of Naval Operations with copies to the Command by way of the Engineering Field Divisions for "concurrent analysis and coordination".<sup>49</sup>

Based upon the funds finally apportioned, the Command prepared an allocation for each activity. Under this new system the Chief of Naval Operations exercised centralized direction, control and distribution of resources through the appropriate chain of command. The Naval Facilities Engineering Command was to be an agent for the Chief of Naval Operations' facilities.<sup>50</sup>

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<sup>49</sup>OPNAV Instruction 11010.23 of 16 May 1967.

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Ibid.

This change in facilities management was not mourned by many outside the Command, where opposition against the single executive concept had always been an important factor. Navy activities and their chains of commands had always felt a certain amount of resentment at the way the Navy Facilities Engineering Command's authority in facility management matters cut across other chains of command.

Under the new Resources Management System concept, the Command still played an extremely important role, but it was strictly advisory. The Command no longer had any authority to enforce its views. With some changes, the Resources Management System concept<sup>51</sup> has remained operative down to the present.

#### THE PLANNING TOOLS

Having discussed the single executive experiment which inaugurated the period covered by this history, let us move on to facilities management planning and programming. Extensive and thorough planning has always been a characteristic of the Command in the program management area. The primary planning tools were the Operating Plans (FY 1966-1969) and the Command Management Plans (FY 1972 onward). Generally speaking, these plans set annual goals and corresponding specific goal targets which the Command was expected to meet.

There were four major Program IX goals in the fiscal year 1966 Operating Plan. They called for (1) the improvement of the management of

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<sup>51</sup>OPNAV Instruction 11010.23B, Change 6, of 7 May 1973.



Program IX by refining the Management Oriented Budget and Information System (MOBIS); (2) The provision of leadership to the armed forces in the technology of public works, public utilities and transportation; (3) the improvement of the efficiency and economy of maintaining and operating public works, public utilities and transportation while rendering high-quality support to the operating forces; (4) the achievement of Navy-wide optimum public works organization consolidations.<sup>52</sup> Under each of these goals were numerous detailed

goal targets. Each was to be achieved during the course of the year, each represented a stage in the completion of the annual goal.<sup>53</sup>

The following year (OP-Plan 1-67), the fourth annual goal to obtain optimum Navy-wide public works organization consolidations<sup>54</sup> was dropped.

The goals were radically altered in the Operating Plan for fiscal year 1968. Three goals remained the same and nine new goals were established: (1) the augmentation of the productivity of the maintenance work force by 10 percent in five years; (2) the assurance that the maintenance of facilities was at the proper level or standard; (3) the achievement of actual cost reductions in the maintenance

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<sup>52</sup> BUDOCKS Operating Plan 1-66, pp. 33-37.

<sup>53</sup> Ibid.

<sup>54</sup> NAVFAC Operating Plan 1-67, pp. 27-29. This goal was also omitted in NAVFAC Operating Plan 2-67, an updating of NAVFAC Operating Plan 1-67 which appeared in August 1967.

of facilities; (4) the equitable distribution of available resources based upon the need to achieve uniform maintenance levels consistent with the mission requirements of the facilities; (8) the improvement of furniture and furnishings in personnel support facilities; (9) the abatement and control of environmental pollution caused by Navy shore activities; (1) the improvement of Naval Facilities Engineering Command sponsored military construction programs; (11) the establishment of an effective minor construction program and; (12) the improvement of the management of the repair program. Goals 5, 6, and 7 of Operating Plan 1-68 are the same as goals 1, 2, and 3 in earlier editions of the plan.<sup>55</sup> In Change 1 of this plan, goal number 10<sup>56</sup> of Program IX was cancelled. In substance the "goals" (now called tasks for the 1-69 Operating Plan) remained essentially the same,<sup>57</sup> although they were presented under a radically different format.

The phase-down of American participation in the Vietnam conflict during the 1968-1970 time period and the extensive funding cutbacks which followed made a redetermination of priorities and a reorganization of the Command a necessity. A whole new planning and management instrument, the Command Management Plan, based on the revised priorities and new organization, was developed and issued for fiscal year 1972. This planning and management instrument was far more comprehensive than the earlier comparatively simple operating plans and allowed far more flexibility in long-range contingency planning.

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<sup>55</sup> NAVFAC Operating Plan 1-68, pp. 29-32.

<sup>56</sup> Ibid., Change 1, Feb 1968, p. 32.

<sup>57</sup> NAVFAC Operating Plan 1-69, pp. 1-25.

The first Command Management Plan specified four major objective areas for Operations and Maintenance. These were: (1) the improvement of the level of technical and management support provided to the Chief of Naval Operations, major claimants, intermediate commands, and shore activities on matters related to maintenance of real property; (2) the procurement and operation of utilities, the operations and maintenance of transportation equipment, and other public works operations, the provision of improved management direction to Public Works Centers to enable them to be fully responsive and cost effective; (3) the retention, restoration or achievement of a favorable balance in environmental and ecological matters affected by Navy actions; (4) the achievement of optimum efficiency and economy in the establishment of requirements and the procurement, and assignment of assets related to the centrally managed programs for fleet moorings, telephone systems, transportation, mobile utility support, and Public Works Center/Construction Battalion Center public works shops.

The Command Management Plans for fiscal years 1973, 1974 and 1975, made no changes in Program IX's objectives.<sup>59</sup> The goal appropriate to each program objective spelled out in detail what was assigned and named fund sources and man-years allocated for the attainment of that objective.

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<sup>58</sup> FY 1972 Command Management Plan, NAVFAC P-441 (Jun 1971), pp. B46 - B 52.

<sup>59</sup> Command Management Plans, NAVFAC P-441, of FY 1973 (Jun 1972), FY 1974 (Jun 1973) and FY 1975 (Jun 1974).



There is no doubt that the Command Management Plan, properly employed, represented a powerful planning instrument for fulfilling the Command's mission responsibilities in the area of operations and maintenance.

What results ensued from all this planning? Accomplishments may best be surveyed under six major functional areas: maintenance, utilities, transportation, public works, pollution abatement, and minor construction.

#### MAINTENANCE

During fiscal year 1965, the Command initiated a yearly maintenance cost summary and a public works control summary for its funded activities. The maintenance cost summary provided a management vehicle for the maintenance effort and was used to collect data for reporting and computing unit cost rates. These cost summaries were extended to the Navy Industrial Fund and to Research and Development in 1966. In fiscal year 1969 they were discontinued.

Progress was made in improving the effectiveness of maintenance management through such accomplishments as the installation of Engineering Performance Standards (EPS) at ten additional activities. An Engineering Performance Standard was a predetermined estimate of how long it will take to do a specific type of job. When a task was assigned to the workers in a given shop, the engineering performance standard for that job was also given them. This standard

gave the workers involved a "record" to compete against and thus it encouraged industry. Action was also initiated to improve the quality and effectiveness of Engineering Performance Standards data developed by the Command as the Office of the Assistant Secretary of Defense (Installation and Logistics) informally indicated that the Engineering Performance Standards would be a primary data source for a central repository of standard data to be used by all Department of Defense components.<sup>60</sup>

Two Engineering Performance Standards craft handbooks were fully revised during the year and changes were made in five of the nineteen other manuals then available. In addition to their use as handbooks for maintenance activities at naval installations, the manuals were made available to industry through the Defense Supply Agency. During a ten month period, more than 2,200 copies were purchased by industry.<sup>61</sup>

The installation of Work Improvement was also carried out by several of the Engineering Field Divisions. Work Improvement was a work simplification technique designed for application by shop forces to find better and easier ways to perform work.

In September 1964, the Command provided the Navy coordinator for, and participated in, the first Department of Defense Conference on real property maintenance management. The 116 recommendations proposed at the conference were studied by the Department of Defense

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<sup>60</sup> Memo from NAVFAC Hqs Code 101 to Code 10C of 23 Jun 1966, enclosure (1), p. 3.

<sup>61</sup> BUDOCKS Progress Report (FY 1965), p. 20.

Real Property Maintenance Command, and formed the basis of future policy formulations.

In the late spring of 1966 the Secretary of the Navy assigned responsibility for the Navy-wide air conditioning program to the Command. Under this program, the Command was required to develop and maintain a long-range air conditioning program which implemented instructions covered by the Department of Defense Construction Criteria Manual. In addition, the Command was given the authority to grant waivers to the Department of Defense policy.<sup>62</sup>

In 1970, the Department of Defense somewhat loosened the waiver requirements so that major claimants were authorized to grant waivers for up to fifteen tons of specialized-use air conditioning equipment. All other requests were still handled by the Command and in some cases involving dental and medical facilities, bachelor officer quarters and family housing, by the Department of Defense directly.<sup>63</sup>

Although funds expended on facilities maintenance during fiscal year 1966 increased from approximately \$150.4 million to \$157.0 million,<sup>64</sup> little maintenance improvement was noted. Instead the maintenance backlog increased to \$173.5 million. This deterioration in the Navy's physical plant was a continuing cause for concern.<sup>65</sup>

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<sup>62</sup>The waivers were granted under specific conditions as set forth in DOD Instruction 4270.1M.

<sup>63</sup>Memo from NAVFAC Hqs Code 101 to NAVFAC Code 10 of 13 Mar 1975, enclosure(2), "Air Conditioning."

<sup>64</sup>"Facilities Management -- O&MN & O&MNR" (chart), NAVFAC Operations and Maintenance, Code 10BB.

<sup>65</sup>Ibid.



In order to improve the quality of key personnel at activities and to provide qualified replacements for them a basic training course for planners and estimators was developed and distributed to field activities during fiscal year 1966. It met with favorable acceptance. An expansion of this basic course was planned so that it would include inspector training for the examination and diagnosis of facility deficiencies. This expansion included a refresher course in basic training for Engineering Performance Standards application.<sup>66</sup>

Fiscal year 1966 saw a major achievement in response to an urgent requirement from Southeast Asia. The Command provided at short notice a large number of moorings for fleet support in that area. Close coordination between Headquarters and the field activities resulted in the judicious use of available components, with minimal new procurement to meet the urgent mooring requirements of the operating forces. The Command also furnished sufficient components for twelve moorings to the Agency for International Development. These were placed in the Saigon area and were for use by commercial vessels.<sup>67</sup>

The responsibility for major Navy repair programs (repair projects costing in excess of \$10,000) continued, in fiscal year 1967, to be a Naval Facilities Engineering Command responsibility. The Command strived to reach a plant condition where the ratio

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<sup>66</sup> Memo from NAVFAC Hqs Code 101 to Code 10C of 23 Jun 1966, enclosure (1), Maintenance Division Data, p. 3.

<sup>67</sup> Ibid.

of the backlog of essential maintenance and repair to the plant replacement value (PRV) would be .25 of 1 percent. As of 1 July 1966, the backlog of validated repair projects (costing in excess of \$10,000) consisted of approximately 1,570 projects.<sup>68</sup> The budget for fiscal year 1967 was only \$25 million. Nevertheless, through reprogramming of internal Navy funds, the Command was able to expend approximately \$30.7 million on repair projects.<sup>69</sup> However, the annual input of new projects was approximately \$30 million. In addition the cost of projects resulting from storms, fires and other causes could not be predicted. By the end of fiscal year 1967, the O&M maintenance backlog had increased to approximately \$184.2 million which meant the Navy plant condition continued to deteriorate at an even more accelerated rate.<sup>70</sup>

Fiscal year 1968 saw only a slight increase in spending: \$155.2 million being expended.<sup>71</sup> During the fiscal year, the maintenance backlog shot up to \$223.4 million. This represented an increase of \$39.2 million. Fiscal year 1969 saw maintenance expenditures increase to \$166.9 million, and the maintenance backlog to \$264.2 million.<sup>72</sup> As is apparent, this increased spending did not even allow for a stabilization of the backlog. The backlog increased by \$40.8 million, while additional funding only amounted to \$11.7 million.

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<sup>68</sup> NAVFAC Progress Report (FY 1967), p. 8.

<sup>69</sup> Ibid.

<sup>70</sup> Ibid.

<sup>71</sup> "Facilities Management -- O&MN & OMNR" (chart), NAVFAC Operations and Maintenance, Code 10BB.

<sup>72</sup> Ibid.

During fiscal year 1969, an important new maintenance program was instituted - Work Simplification. This program grew to encompass many functions. The purpose of the program was simply to reduce maintenance costs by standardizing and simplifying all procedures as far as possible.<sup>73</sup> This involved the acquisition of maintenance materials and parts possessed of a longer life-cycle than those currently in use. Under this program all major commands and claimants were required to conduct a management improvement program. Offices at every level were given sufficient latitude to adopt the program to the needs of their own field activities. This applied particularly to the selection of areas in need of management attention and to the determination of the form and level of achievement goals. The program consisted of the following five elements: (1) management effectiveness, designed to pinpoint and alleviate significant command problems; (2) cost reduction, a continuing review of existing practices, processes, procedures and requirements; (3) idea interchange, a means of making information on improvement actions available to others; (4) recognition, used to motivate personnel identified with making work simplification improvements; and (5) special studies, applied to projects as directed by higher command.<sup>74</sup>

The Work Simplification Program was one way to implement the Management Improvement Program, since Work Simplification provided a means for making optimum use of labor-saving equipment, improved

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<sup>73</sup> NAVFAC Instruction 11014.46A of 16 Jan 1974, p. 1

<sup>74</sup> Ibid.



methods and system refinements. The Engineering Field Divisions installed the Work Simplification Program when specifically requested<sup>75</sup> by a major command or activity.

In fiscal year 1970, \$160.8 million was spent on maintenance,<sup>76</sup> a decrease of \$6.1 million from the previous year's expenditure. This reduction in funding was a reflection of the United States<sup>77</sup> disengagement from Vietnam, which had begun in 1968. Despite decreased expenditure, it is interesting to note that the maintenance backlog only increased by \$9.9 million. This was less than one-quarter of the previous year's increase. However, during the following year the maintenance backlog jumped a staggering \$62.7 million to \$336.8 million.

This dramatic increase was directly caused by a limited budget, rising material and labor costs, progressive plant deterioration, and higher priorities assigned by shore activity commanding officers to other requirements. Maintenance only received \$152.6 million to meet its fiscal year 1971 needs, \$8.2 million less than the previous year. But unlike the previous fiscal year, there was no decline in the rate of increase of the maintenance backlog. Instead, in fiscal year 1971 the maintenance backlog increased by<sup>78</sup> some \$62.7 million. To counter this trend \$155.8 million was

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<sup>75</sup>NAVFAC Instruction 11014.46A of 16 Jan 1974, p. 1.

<sup>76</sup>"Facilities Management Chart - O&MN & OMNR" (chart), NAVFAC Operations and Maintenance, Code 10BB.

<sup>77</sup>Ibid.

<sup>78</sup>Ibid.

spent the following fiscal year and this considerably reduced the rate of increase. The fiscal year 1972 increase amounted to only \$22.7 million. Fiscal year 1973 saw a large increase in expenditures, a total of \$183.3 million was spent. This was \$25.5 million more than the previous year. All told maintenance yearly spending had increased by \$32.9 million, since a low point reached in fiscal year 1964. Fiscal year 1974 saw a \$9.1 million decrease in spending, yet the maintenance backlog increased by only \$27.4 million, \$.6 million less of an increase than in fiscal year 1973. This trend continued during fiscal year 1975, as the Command made a decisive effort to rehabilitate the Navy's physical plant. Facilities maintenance spending rose to \$225 million, an increase of \$105.8 million over the previous year's spending. This course of action and the shore establishment realignment decreased the backlog by \$62.7 million. Decisive action to increase potential performance, by improved work management techniques, and improve resource distribution could contribute to improving the backlog problem.

#### UTILITIES

The total cost of utilities operations funded by the Bureau of Yards and Docks during fiscal year 1965 was approximately \$74 million. This included about \$26 million for electrical service, about \$7 million for water and sewage, and approximately \$41 million for other utilities.<sup>79</sup> In keeping with President Lyndon Johnson's

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<sup>79</sup> BUDOCKS Progress Report (FY 1965), p. 18.

CHART 11-1

## MAINTENANCE FUNDING AND BACKLOG

Fiscal Year	1965	1966	1967	1968	1969	1970	1971	1972	1973 *	1974	1975
											Est.
Maintenance floor (mil. \$)	150.4	157	161.8	155.2	166.9	160.8	152.6	155.8	172.5	200.7	221.3
Backlog (mil. \$)	169.0	173.5	184.2	223.4	264.2	274.1	336.8	359.5	361.1 *	400.0 *	390.0 *

\* Air and Surface Reserves transferred to separate appropriations starting with FY 1973.



interest in water and air pollution abatement, the Bureau prepared reports on remedial actions underway at 138 Navy and Marine Corps installations.<sup>80</sup>

The overall cost of telephone service was reduced and speedier, more flexible, and more efficient service was achieved through the installation of five Centralized Exchange Service (CENTREX) systems during fiscal year 1965.<sup>81</sup>

Instituted by the Chief of Naval Operations in 1957, the Centralized Exchange Service was a mechanization program for Navy Administrative Telephone systems.<sup>82</sup> Utilizing the very latest equipment and techniques, Centralized Exchange Service was designed to speed telephone calling, simplify record keeping and increase efficiency and economy. Unlike other methods of supplying telephone service, Centralized Exchange Service provided a complete service package at a single flat rate. This service included all of the necessary inside and outside plant facilities, including central office trunks, switchboard positions, and cable plant.<sup>83</sup>

The services that Centralized Exchange Service offered included: direct inward dialing to avoid the need for switchboard operators,

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<sup>80</sup>Memo from NAVFAC Hqs Code 63.300 to Code 63.122 (date illegible) subj: Annual Report to SECNAV, enclosure (1), p. 1.

<sup>81</sup>Ibid.; BUDOCK Progress Report, (FY 1965), p. 18.

<sup>82</sup>NAVFAC Instruction 2300.2B of 23 Dec 1974, p. 2.

<sup>83</sup>Ibid., enclosure (1).

direct distance dialing to allow all telephones access to local and long distance dial-switching networks, station transfer to allow a call to be transferred from one line to another without operator assistance, mechanical intercept to answer with recorded messages those lines which were disconnected, rotary service to automatically switch calls from one line to another when the first line was unmanned, simplified billing to reduce record keeping, consoles to replace<sup>84</sup> bulky switchboards, faster installation and better maintenance.

Although economy had always been a major consideration when adopting a new program, the Command felt that the contemporary demand for speedier, more reliable voice communications made it imperative that the Navy modernize and streamline its administrative telephone systems. In some cases, such modernization might have resulted in higher monthly telephone bills, but this was the necessary price for assuring that a station telephone system would be adequate<sup>85</sup> to cope with the progressively more exacting demands placed upon it.

For cost effectiveness complete modernization of both in-and-out dialing under Centralized Exchange Service was justified for the larger base systems, although it was not always economically feasible for smaller systems (especially those of less than 200 lines). Where complete mechanization was not feasible, it sometimes proved<sup>86</sup> desirable to mechanize for out-dialing only.

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<sup>84</sup> NAVFAC Instruction 2300.2B of 23 Dec 1974, enclosure (1).

<sup>85</sup> Ibid.

<sup>86</sup> Ibid., p. 4.

Utilities improvement and innovation during the last decade was not only limited to telephone systems. One of the most important areas of utilities development in recent years was in the field of emergency and temporary utilities support. This development was carried out under the aegis of the Mobile Utilities Support Equipment Program.

The Mobile Utilities Support Equipment (MUSE) Program was established in fiscal year 1963 by the Chief of Naval Operations, to "provide interim utilities support for meeting Department of the Navy requirements." From the program's beginning, support was provided to both the forces afloat and to the shore establishment. This support included electric power, steam, air conditioning (industrial), potable water and compressed air.

Major emphasis was placed upon achieving the greatest equipment mobility technically possible. Where weight and size limitations permitted, air transportability was incorporated in equipment designs. In other cases, surface mobility was incorporated to the maximum extent.

The Mobile Utilities Support Equipment Program was originally conceived to deal with the needs arising from accidents, emergencies and unforeseen changes in planning and programming. Actual practice

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<sup>87</sup> CNO Ltr (Op-444 F/ep, Ser 4314) of 15 Jul 1963, p. 4; OPNAV Instruction 11300.2 of 10 Jul 1969.

<sup>88</sup> CNO Ltr (Op-444, F/ep, Ser 4314) of 15 Jul 1963, p. 4.

<sup>89</sup> Ibid.



however showed that the program was ideally suited for other temporary applications. These included support for the build-up of United States forces in Southeast Asia, support for ships in "cold iron" status (The term "cold iron" indicated that a ship's own steam or electric generating facilities were shut-down, either for maintenance purposes or to allow a smaller watch-standing force. When a ship was "cold iron." Mobile Utility Support Equipment supplied the steam and/or electricity necessary for the normal ship-board routine), support for research, development, testing and evaluation, short term testing for the utility support requirements during the construction phase at remote locations, and finally for temporary replacement of equipment shut down for major maintenance or overhaul.<sup>90</sup>

During fiscal year 1965, the second year of its existence, the program was expanded to meet increasing emergency needs and unexpected requirements for electric power generation, steam generation, air conditioning and mobile water conversion (desalinization) plants. Procurement was made for six 600 KW diesel electric plants, two 700 KW gas turbine electric plants, two 200 KVA electric power substations, two 60,000 lb/hr steam generators, twelve 15 ton air conditioning units, and one 14,400 gpd. desalination plant. Critical power generation and substation support was provided for Pacific

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<sup>90</sup> CNO Ltr (Op-444, F/ep, Ser 4314) of 15 Jul 1963, p. 4.

communications facilities at various locations by Mobile Utility Support Equipment and the desalination plant was deployed to Antigua.

Another desalinization/power generation plant was placed in full operation at the Naval Base, Guantanamo Bay, in March 1965. The plant consisted of three flash-type evaporators with a combined output of 2.2 million gallons of fresh water per day at a cost of 97 cents per 1,000 gallons. The installation also included two 7,500 KW generators and three 120,000 lb/hr steam generators. This plant made the Guantanamo Naval Base self-sufficient for its water and power requirements. As a result of its installation, a \$175,000<sup>91</sup> annual savings was possible.

The first nuclear core refueling of the Navy's 1800 KW PM-3A Nuclear Power Plant at McMurdo Station in Antarctica was carried out in 1965. Since its inauguration in March 1962, the power plant had supplied more than ten million kilowatt hours to the station. The replacement core was a new model and it reduced future power costs<sup>92</sup> from approximately 5 to 2.5 cents per kilowatt hour. Before it was finally shut down in 1974 for reasons of cost effectiveness, this nuclear power plant was to furnish a total of sixty million kilowatt hours and thirteen million gallons of potable water (produced from sea-water) to the station.

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<sup>91</sup>BUDOCKS Progress Report (FY 1965); Memo from NAVFAC Hqs Code 10C to Distribution List of 6 Jun 1967, enclosure (2), "Annual Report to SECNAV."

<sup>92</sup>BUDOCKS Progress Report (FY 1965), p. 19.

As touched upon above, Mobile Utility Support Equipment was used extensively in Vietnam from fiscal year 1965 onward. Although Mobile Utilities Support Equipment generators were not specifically designed for the requirements of Vietnam, actual use showed that they were aptly suited for replacing the tactical-type generators then in use. The equipment size (100 to 1500 kilowatts), its life between overhauls (500 to 10,000 hours), and its inherent mobility were exactly suited to satisfy cantonment or garrison needs until permanent central power plants and distribution systems could be installed.

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Altogether during fiscal year 1965, \$5.89 million of Mobile Utility Support Equipment, Other Procurement Navy funds were spent for such equipment in support of operations in Southeast Asia.

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Compared with national trends, the Navy's performance in the utilities area was very good during fiscal year 1966. Larger and more sophisticated loads, impressed on utility systems by increasing applications, resulted in substantial increases in Navy as well as national consumption figures. The national consumption of electricity was up 8 percent while Navy consumption was up to 7 percent. The national consumption of water was up 4.5 percent while Navy consumption was up 1 percent. Navy conservation practices accounted for these differences. Unit costs remained relatively stable. Only 10 percent of the Navy's electrical

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<sup>93</sup> Memo from NAVFAC Hqs Code 01 to Code 09 of 3 Jul 1967, enclosure (1) "Annual Report to SECNAV," p. 4.

<sup>94</sup> Ibid.



plants were less than ten years old at this time, while nationally more than 50 percent were less than ten years old. Despite this, Navy production costs remained the same during fiscal year 1966, while<sup>95</sup> nationally the cost decreased by only 0.4 percent.

During the fiscal year 1966, the Mobile Utility Support Equipment Program was greatly expanded to meet increasing emergency power requirements in Southeast Asia. More than 150 mobile diesel electric generator plants, ranging in size from 100 kilowatts to 1,000 kilowatts, as well as other Mobile Utility Support Equipment assets (total value \$5million ) were purchased and delivered to Vietnam.<sup>96</sup> These increases made Mobile Utility Support Equipment the biggest supplier<sup>97</sup> of electricity within the I Corps Area of the Republic of Vietnam.

During fiscal year 1966, Mobile Utility Support Equipment Other Procurement Navy funds provided \$5.45 million of equipment support to Southeast Asia operations. Additional generating units, substations, boilers and similar items were made available to provide emergency power at many other locations throughout the world. These included the Naval Station at Rota, Spain; the Naval Ordnance Testing Station, San Clemente; and the National Aeronautics and Space Agency, Guam. Mobile Utility Support Equipment was also used extensively during<sup>98</sup> the year to provide pier-side power and steam for the fleet.

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<sup>95</sup> NAVFAC Progress Report (FY 1966), p. 21; Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967, enclosure (1), "Annual Report to SECNAV," p. 5.

<sup>96</sup> Memo from NAVFAC Hqs Code 10C to Code 102 of 21 Jun 1966, enclosure (1) "Annual Report to SECNAV," p. 5.

<sup>97</sup> Memo from NAVFAC Hqs Code 101 to Code 10 of 13 Mar 1975, enclosure (3) "MUSE."

<sup>98</sup> Ibid.

That same year, studies were conducted in conjunction with the Ships Parts Control Center, Mechanicsburg, Pennsylvania, which looked toward worldwide improvement of utilities repair parts support. In this connection, a pilot run of "provisioning" type utilities spare parts support, at the Naval Recruiting Station, Cutler, was nearing completion. The Consolidated Allowance List for this station was completed by the Ships Parts Control Center, Mechanicsburg, and was under review by Naval Recruiting Station and Naval Facilities Engineering Command personnel. This recommended allowance and cross-reference list substantially reduced required on-hand stocking, but provided still more readily available components through increased use of Navy Stock Fund supplies. This type of support system was also established at the Naval Communications Station at Northwest Cape, Australia. The applicable Consolidated Allowance Lists developed were to be used for provisioning all vital utilities systems. Primary Consolidated Allowance Lists were due for review in October 1966 with completion of on-board stocking scheduled for 1 July 1967.<sup>99</sup>

The Navy Administrative Telephone System's modernization and improvement program continued to progress satisfactorily during fiscal year 1966. Systems at six major activities were converted to Centralized Exchange Service. Five other large installations where it had already been installed yielded steady returns in service improvements, reduced operation costs, and other, intangible

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<sup>99</sup>Memo from NAVFAC Hqs Code 101 to Code 10 of 13 Mar 1975, enclosure (3), "MUSE."

benefits inherent in the telephone modernization program. This program was to be continued indefinitely with the objective of keeping abreast of new technological developments and to assure that the Navy wire communications system could continue to meet the increasingly more exacting requirements placed upon it.<sup>100</sup>

In keeping with national trends, the Navy's consumption of utilities increased during fiscal year 1967. This increase was however slightly lower than the average national increase. Despite escalating operating costs and the need to meet many demands with smaller or older generating plants and equipment, Navy unit cost remained relatively stable.<sup>101</sup> All told, during fiscal year 1967, a total of \$85.7 million was expended on utilities operations.<sup>102</sup> The setting of utility targets continued throughout the year at various activities. This management tool for determining the approximate quantities of utilities that an activity should consume aided many commanding officers to control rising utility costs and thus make funds available for other purposes.<sup>103</sup>

During the year, field investigations and engineering studies were completed at ten selected naval activities in the Pacific area

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<sup>100</sup> Memo from NAVFAC Hqs Code 101 to Code 10 of 13 Mar 1975, enclosure (3), "MUSE."

<sup>101</sup> NAVFAC Progress Report (Fy 1967), p. 5.

<sup>102</sup> "Facilities Management--OM&N and OMNR" (chart), NAVFAC Operations and Maintenance, Code 10BB.

<sup>103</sup> NAVFAC Progress Report (FY 1967), p. 5.



in order to determine the adequacy of waterfront utilities. These investigations initiated a planned worldwide waterfront study to establish the capabilities and deficiencies of selected waterfront facilities and to assist in the planning of whatever corrective actions were found necessary.<sup>104</sup>

The consolidation of the boiler inspection services at the Engineering Field Divisions, which continued during fiscal year 1967, was to provide substantial savings in the utilities area due to a better utilization of manpower and reduced training costs.<sup>105</sup>

The Command's Boiler Inspection Program has led a checkered existence. It was operated under contract by the Hartford Insurance Company in the 1940s. In the 1950s the Navy obtained a few inspectors of its own. Although generally each activity was responsible for its own boiler inspection, in 1965 a school was started to guarantee a general level of inspector competence.<sup>106</sup>

In their Naval Districts, these local inspectors had to spend 50 percent to 100 percent of their time inspecting boilers and unified pressure vessels in order to meet minimum requirements. When not inspecting boilers, these men filled in on maintenance work. NAVFAC Notice 11014, issued in June of 1967, required that as of 1 July 1967 all boiler inspectors be staffed at the Engineering

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<sup>104</sup>NAVFAC Progress Report (FY 1967), p. 5.

<sup>105</sup>Ibid.

<sup>106</sup>Telecon with Mr. B. T. Lewis, NAVFAC Operations and Maintenance, Code 1053 of 27 Feb 1975.

Field Divisions. This was to reduce the total cost of inspection and training (certification as an inspector) and provide closer control of inspection procedures.<sup>107</sup> Unfortunately for this attempt to consolidate the Boiler Inspection Program, funding was cut during the post-Vietnam years. The program was finally dropped in 1972.<sup>108</sup> After the cancellation of this program, inspection was once again carried out locally by each individual activity. The only exceptions were certain activities located on foreign soil which had their inspection done locally by foreign contractors.<sup>109</sup>

Like the Boiler Inspection Program, the Fire Marshal Program also led a somewhat checkered existence. Originally established in 1946, Fire Marshals and Assistant Fire Marshals were assigned to Naval District Commandants. The Chief of Naval Operations directed "the function of firefighting, including training, coordination, standardization of equipment, and liaison with Municipal Fire Departments be transferred to the District Fire Marshal (DFM)." They reported to the District Staff Officer designated by the District or River Commandant. There were a total of twenty-five DFMs and assistants.

The Fire Marshal function was transferred to Chief of Naval Material in June 1971. In August 1971, the Chief of Naval Operations directed the Fire Marshal function to be assigned to the Command for administration. Eight positions were transferred, seven to the

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<sup>107</sup> Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967, enclosure (1), "Annual Report to SECNAV," p. 6.

<sup>108</sup> Lewis telecon.

<sup>109</sup> Ibid.

Engineering Field Divisions and one position to Headquarters.

District Fire Marshals were assigned to the appropriate Engineering Field Divisions in their respective geographical areas and became Area Fire Marshals (AFMs). The position retained at NAVFAC Headquarters was assigned to Code 10 as the Fire Marshal Program Coordinator, Code 10F.

Significant improvements have accrued to the Navy-wide support of firefighting functions by close coordination of operating needs with mobile equipment procurements. Specific unique operating equipment needs have been identified and presented to the equipment procurement managers to insure adequate consideration for design and technical capability improvements. Uniting the fire equipment users with the fire equipment design and procurement group resulted in a new type structural pumper, improved aircraft fire rescue trucks and a more realistic assignment of equipment to areas of greatest need.

There were also significant accomplishments in the area of training. Establishment of training courses for field personnel continued during fiscal year 1967. One manual, MO-207 Operations and Maintenance of Internal Combustion Engines, was especially well received in the field. In addition, private industry made numerous requests for copies of the manual with the result that plans were made for sale of the publication by the Government Printing Office.<sup>110</sup> Tremendous progress was made in Mobile Utilities Support Equipment.

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<sup>110</sup> NAVFAC Progress Report (FY 1967), p.5.



program support rendered to the operating forces. The fiscal year 1967 expenditures for new equipment exceeded \$9.5 million. The greater part of these equipment purchases was directly related to Southeast Asian support.<sup>111</sup>

The Command's Mobile Utility Support Equipment Program in Southeast Asia was under the technical management of the Utilities Division, Deputy Commander, Pacific Division, Naval Facilities Engineering Command, Southeast Asia. This annex, an extension of the Pacific Division, was chartered by the Command and had, in July 1967, a Mobile Utility Support Equipment Inventory of six 1500 KW generators, twenty-two 700 KW generators, twenty-eight 250 KW generators, and more than one hundred 100 KW generators together with associated transformers.<sup>112</sup> The Mobile Utilities Support Equipment inventory for this area was scheduled to be increased by approximately 50 percent to 300 pieces of equipment.<sup>113</sup> Plans to improve air-mobility of Mobile Utility Support Equipment were incorporated into the specifications for the new purchases. The largest single addition to the Navy's power generating capability in fiscal year 1967 was made when the U.S. Air Force

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<sup>111</sup> NAVFAC Progress Report (FY 1967), p. 5.

<sup>112</sup> Ibid.

<sup>113</sup> Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967, enclosure (1), "Annual Report to SECNAV," p. 4.

returned the power barge YFP-10 to the Navy. This barge was capable of producing 34,500 kilowatts of electrical energy per day.<sup>114</sup>

During the year, extensive studies were made on the "cold iron" requirements of the fleet. As a result, two new power barges, one for the Atlantic Fleet and one for the Pacific Fleet, were constructed. They were used to furnish electricity and steam to ships that were in port. As a result fewer personnel were required to remain aboard during in-port periods. These two barges were added to the Mobile Utilities Support Equipment generators, air compressors and boiler plants already being used on piers to support the fleet.<sup>115</sup>

A study conducted under contract by Gibbs and Hill to determine "cold iron" requirements at ten activities in the Pacific area, indicated an urgent need to update electrical shore power criteria. Concurrently, the Commander-in-Chief, Atlantic Fleet requested the Atlantic Division to determine the overall berthing requirements of the fleet, based on a homeport forecast. The Atlantic Division was assigned responsibility for conducting a two-part study consisting of: phase 1; the updating of Naval Facilities Engineering Command design criteria for electrical shore power to ships, and phase 2; determination of berthing requirements for the Atlantic Fleet. The Atlantic Division completed the evaluation of the "cold iron" electrical design criteria and Naval Facilities

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<sup>114</sup> NAVFAC Progress Report (FY 1967), p. 6.

<sup>115</sup> Ibid., p. 6.

Engineering Command Headquarters reviewed the criteria and approved their use for determining shore power requirements for Atlantic Fleet berthing. This study augmented the data collected by the Gibbs and Hill study.<sup>116</sup>

Fiscal year 1967 saw the dedication and commencement of operation of the Navy's first salvage fuel boiler plant. Up to 360 tons of municipal type refuse could be burned each day in this plant. The heat from the burning refuse was used to produce up to 2,880,000 lbs. of saturated steam a day.<sup>117</sup>

Significant service improvements and economies were again realized from the implementation of the telephone modernization program during 1967. Fifteen additional Navy administrative telephone systems were converted to Centralized Exchange Service.<sup>118</sup>

Two comprehensive telecommunication studies were initiated during the year for the Office of the Assistant Secretary of Defense (Installation and Logistics): a Metropolitan Communications Complex survey of fifteen metropolitan areas, and a Command Central Communications Study. Steps were also taken to improve dockside telephone service to the forces afloat. Where telephone service was leased, the Naval Facilities Engineering Command field

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<sup>116</sup> Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967, enclosure (1), "Annual Report to SECNAV," p. 7.

<sup>117</sup> NAVFAC Progress Report (FY 1967), p. 6.

<sup>118</sup> Ibid.



divisions negotiated with the telephone companies for improved dockside service.<sup>119</sup>

During fiscal year 1968 and 1969 the Mobile Utilities Support Program continued to support operations in Vietnam. This support peaked in November 1969, and included fifty-two power plants with a total generating capability of 50,200 kilowatts, fifteen substations with a total capability of 47,000 KVA, and fifteen air conditioning units with a total capability of 225 tons. The total value of Mobile Utilities Support Equipment in Vietnam was approximated \$10 million at this time. The phase-down of Navy utility support during the spring and summer of 1970, plus the Army's assumption of many of the Naval Support Activity, Danang's former responsibilities, resulted in the transfer and loan of equipment to the Army under the terms of an Army-Navy loan agreement of 1 July 1970.<sup>120</sup>

The Navy subsequently recovered thirty-two power plants with a total capacity of 40,750 kilowatts and fifteen substations with a total capacity of 55,250 KVA based upon trade of Mobile Utilities Support Equipment for equipment procured with Southeast Asia military construction funds. The total value of equipment returned was approximated \$9.5 million. The return of equipment was completed with the exception of two 1500 KW power plants loaned to the Army at Danang.

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<sup>119</sup>NAVFAC Progress Report, (FY 1967), p. 6; Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967, enclosure(1), "Annual Report to SECNAV," p. 5.

<sup>120</sup>Memo from NAVFAC Hqs Code 101 to Code 10 of 13 Mar 1975, enclosure(3), "MUSE."

The first shipment of returned units arrived in the United States in May 1971. Equipment rehabilitation was completed with Army funds and the Mobile Utilities Support Equipment was redeployed to satisfy urgent Navy needs.<sup>121</sup>

Early in 1971 the Command was given the task of providing support to an accelerated "cold iron" program because of a backlog in military construction funded deficiencies and long lead time for completion of permanent utility facilities. A study showed that Mobile Utility Support Equipment was suitable for meeting steam and electric deficiencies at existing piers and the Chief of Naval Operations increased Other Procurement, Navy funding by \$12.5 million during fiscal years 1971, 1972 and 1973 for the procurement of new Mobile Utilities Support Equipment. Contracts were awarded for twenty-four 2,000 KW power plants, forty-one 2,500 KVA substations, and thirty-four 20,000 lbs/hr. boilers. By 1974 a total of thirty power plants, fifty-three substations and twenty-three boilers had been deployed for interim "cold iron" support to the fleet.<sup>122</sup>

The year 1970 marked the beginning of a new program, Computer Assisted Utility Engineering. In this year digital computer programs and service with a time sharing computer company replaced the DC and AC network analysis which had been used since 1957 and 1958 respectively.

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<sup>121</sup> Memo from NAVFAC Hqs Code 101 to Code 10 of 13 Mar 1975, enclosure (3), "MUSE."

<sup>122</sup> Ibid.

During the 1960s the AC and DC network analyzers were used extensively to conduct in-depth analyses of seven activity electrical distribution systems each year. These analyses paid off handsomely by improving system reliability, improving the activities' knowledge of their own electrical systems capabilities and limitations, and optimizing the benefits of planned system improvements while reducing their cost. The major limitation of these studies was that they had to be conducted at Command Headquarters and analyzer availability limited the number of studies which could be conducted. This limitation was a major factor in the 1970 change over to digital computer analysis. The advancement of digital computer technology into power system analysis permitted the expansion of this capability to all the Engineering Field Divisions.

Each Engineering Field Division used a time-sharing computer terminal connected to a large central computer to conduct five in-depth electric power system analyses each year. In addition, the divisions used the computer to aid in the solution of numerous operating problems thereby enabling engineers to evaluate more alternative solutions and complete their analysis in less time than was usually required for a single manual analysis.

Because this program had such a tremendous pay-off in the electrical area it was expanded to include mechanical utility distribution systems such as steam lines, compressed air systems, water systems and so forth.<sup>123</sup>

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<sup>123</sup> Memo from NAVFAC Hqs Code 102 to Code 10B of 24 Mar 1975, enclosure (1).



Another major program which opened the 1970s was the Utilities Improvement Program. The Command inaugurated the Utilities Improvement Program in January 1970 for the purpose of applying management engineering techniques to the Navy's utilities systems.<sup>124</sup>

This program provided a comprehensive consistent review of the Navy's utilities systems, identified Navy-wide utility deficiencies and recommended realistic resolutions in all funding areas. The program was basically a technical effort of the Engineering Field Divisions. It was to be a functional investment program funded by military construction funds. The Command's role as agent for the Chief of Naval Operations for this program<sup>125</sup> comprised the overall review of all military construction line items within the program. Utilities engineers at the Engineering Field Divisions conducted surveys of their geographical activities, identified utilities systems deficiencies and recommended solutions. Command Headquarters then evaluated all utilities military construction projects and recommended priorities.

In response to a presidential order in the summer of 1973 for a national energy conservation effort, the Secretary of Defense issued a directive to the armed services requesting them to reduce energy consumption by 15 percent and to develop a comprehensive energy reduction program. The outbreak of an Arab-Israeli War in October 1973 and the subsequent Arab oil embargo made such

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<sup>124</sup>NAVFAC Notice 11310 of 27 Jan 1970.

<sup>125</sup>NAVFAC Instruction 11310.42 of 21 Sep 1972.

energy conservation an urgent necessity. The Navy ordered across the board reductions in heating and lighting to decrease the consumption of fuel oils. Since 1973 energy conservation has been a prime goal in the utilities area. The target for fiscal year 1974 was a 15 percent reduction in consumption relative to 1973. The Navy's shore facilities attained a 10.1 percent reduction in fiscal year 1974 and 11.2 percent in fiscal year 1975 to date as shown in the following table. Total Navy consumption figures include air, sea, other ground support and utility consumption.

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CHART 11-2                      ENERGY CONSUMPTION REDUCTIONS  
(Compared to fiscal year 1973 baseline)

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	Total		Shore Facilities Only	
	DOD	Navy	DOD	Navy
FY 74	25.9%	24.1%	12.0%	10.1%
FY 75	including COLD IRON Support			11.2%

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Recognizing that substantial energy reduction in shore facilities could be accomplished through capital investment, the Chief of Naval Operations in January 1974, requested each of his principal subordinates to submit: (1) A listing of all known high payback energy saving projects that could be accomplished through fiscal year 1976; (2) a follow-on program for five additional years.<sup>126</sup> This led to the development of a new program - the Energy Conservation

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<sup>126</sup>Point Paper on the Energy Conservation Investment Program (ECIP), NAVFAC Operations and Maintenance, Code 102.

Investment Program (ECIP). In answer to the Chief of Naval Operations' request, approximately 1,000 projects calling for more than \$280.6 million in military construction programming funds and \$300 million in other funding categories were submitted for the first year's funding.

After screening all projects for DOD criteria satisfaction<sup>127</sup> and working within limited budget constraints and requirements needs, the five year Navy ECIP shown in Chart 11-3 was developed.

CHART 11-3 PROPOSED FIVE YEAR MCON PROGRAM  
ENERGY CONSERVATION INVESTMENT PROGRAM

Fiscal Year	76	77	78*	79*	80*	81*
Program (\$ Mil)	38.9	68.7	91.0	96.9	105.1	75.0
Cumulative		107.6	198.6	295.5	400.6	475.6

\* Tentative

The fiscal year 1976 program was approved through congressional committee and both the fiscal year 1976 and 1977 programs have received additional monies from DOD over and above the original MCON levels. The projects funded through this program were identified and developed by the activities with the assistance of Engineering Field Division engineers during energy conservation

<sup>127</sup>To be selected, projects had to be for the refit/modernization of existing facilities only. They had to be self-amortizing in 5 years (FY 1976), 10 years (FY 1977), or 10 years (FY 1978-1981). They could only be located at facilities in the 50 states, and they had to generate documented savings (energy and dollars). Major new construction and "cold iron" projects were excluded. Major repair/modernization projects were included at a percent of total (0% in FY 1976, 20% in FY 1977, and 25% in FY 1978).



surveys. It was believed that this technical approach to conservation would make a major permanent effect on shore facilities energy usage and be a significant aid in combating the effect of rapidly rising energy prices on shore fleet support.

Total Navy utility operating costs, excluding maintenance of utility systems, for fiscal years 1968 through 1970 showed a tendency towards level funding, being \$172, \$169 and \$176 million. This trend began to change in fiscal year 1971 when high energy costs were first being experienced. In fiscal year 1971 utility operating costs increased to \$190 million and by fiscal year 1975 reached \$407 million. From fiscal year 1970 through 1973 utility operating costs increased at an annual rate of 9.5 percent with energy leading the cost increases. For the fiscal year 1973 through 1975 period, total utility costs increased 78.5 percent. During this same period, energy costs increased 136 percent and energy increased its share of total operating costs from 59.3 percent in fiscal year 1973 to 78.3 percent in fiscal year 1975, even though energy consumption was reduced by a projected rate of more than 11 percent in fiscal year 1975.

#### TRANSPORTATION EQUIPMENT

At the beginning of fiscal year 1965, the Bureau of Yards and Docks assumed Navy-wide management responsibility for specialized transportation equipment. This included such items as aircraft

refuelers, crash fire trucks, bomb service trucks, crash cranes and other similar types of equipment.<sup>128</sup>

As a result of years of deferred procurement the specialized equipment program had all the problems connected with operating a category of equipment that lacked a planned and systematic replacement program. In 1964 only \$1.8 million was expended for new equipment. The budget base transferred to the Command for fiscal year 1966 was augmented on a crash basis to \$6 million. By reprogramming, the Command was able to allocate \$6.2 million. For it was the goal of the specialized equipment program to achieve the same results as those achieved by the general transportation equipment program (which was itself assigned to the Bureau in 1961).<sup>129</sup>

Approximately 690 items of transportation equipment, valued at around \$3.5 million were taken from the fiscal year 1965 replacement program and shipped to fill requirements in Southeast Asia. This equipment consisted of buses, trucks, heavy mobile construction and weight handling equipment. The centralization of this program under the single manager or single executive concept permitted maximum flexibility in fulfilling these needs.<sup>130</sup>

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<sup>128</sup>BUDOCKS Progress Report (FY 1965), p. 20.

<sup>129</sup>Memo from NAVFAC Hqs Code 10 to Code 09 of 18 Jan 1967, subj: Review of Program IX; NAVMAT Instruction 4440.38 of 1 Jul 1964.

<sup>130</sup>BUDOCKS Progress Report (FY 1965), pp. 20-21.

Increased emphasis was placed on accelerated procurement procedures with the result that procurement lead time was reduced by several months. By using computers to consolidate requirements and prepare procurement packages, it was possible to release items within forty-five days. This was a decided improvement, if one takes into account that previously employed manual methods took an average of eight months to do the same task.

During fiscal year 1965 it was possible to reduce the average age of motor vehicles to 4.6 years. This was a significant drop from an average age of 5.3 years in fiscal year 1964.<sup>131</sup> The cost of vehicle maintenance declined from \$.0378 per mile per vehicle in fiscal year 1964 to \$.0324 in fiscal year 1965. Based on a total gross mileage of 295 million miles, this produced a total savings of \$1.5 million.<sup>132</sup>

Modernization of the transportation fleet continued during fiscal year 1966. Procurement of new equipment proceeded at a rapid rate, with \$49.9 million worth being purchased from appropriated funds.<sup>133</sup> These purchases helped reduce the average age of administrative vehicles to 4.1 years. (In fiscal year 1962, the average age was 6.9 years). This reduction met the goal set

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<sup>131</sup>"Navy-wide Vehicle Maintenance Cost Travels and Goals" (chart), NAVFAC Operations and Maintenance, Code 1032B.

<sup>132</sup>Ibid.

<sup>133</sup>Memo from NAVFAC Hqs Code 10 to Code 09 of 18 Jan 1967, "Review of Program IX."



by the Operating Plan for fiscal year 1966.<sup>134</sup> Downtime was also very low during fiscal year 1966, only 6.7 percent. Operations and maintenance costs per mile declined to \$.0308 per mile per unit.<sup>135</sup> This achievement fell short of the Operating Plan goal of \$.0300 for fiscal year 1966.<sup>136</sup> Total gross mileage was 312 million miles.

During fiscal year 1966, the Naval Facilities Engineering Command provided on an emergency basis about 2,700 units of heavy transportation equipment at a cost of approximately \$14.5 million for the support of Southeast Asia operations. This equipment was particularly for use at ports and beaches in South Vietnam. It consisted of trucks, construction equipment and heavy mobile equipment. Centralization of Program IX under the single executive concept was again considered to be a major factor in permitting maximum flexibility in responding to emergency requirements of this type.<sup>137</sup>

Fiscal year 1966 saw the introduction of the first phase of a completely integrated management oriented budget and information system for transportation. Complete unit cost standards for

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<sup>134</sup>BUDOCKS Operating Plan 1-66, p. 35.

<sup>135</sup>Ibid.

<sup>136</sup>Ibid., p. 36.

<sup>137</sup>Memo from NAVFAC Hqs Code 104 to Code 10C of 22 Jun 1966, enclosure(1), "Annual Report to SECNAV," p. 7.

maintenance operations of each vehicle type and equipment unit were promulgated Navy-wide. These were used in the preparation of the fiscal year 1968 budget estimates. Beginning with the second semester of fiscal year 1966, these standards were also used as an improved tool to appraise transportation management performance. It was expected at the time that a completely integrated system for budget planning, execution and appraisal would be in full operation by fiscal year 1968.<sup>138</sup>

During fiscal year 1967, Navy-wide vehicle maintenance cost per mile continued to decrease being 2 percent lower than for fiscal year 1966.<sup>139</sup>

The average cost of vehicle operation per mile was reduced from \$.0308 to \$.0301.<sup>140</sup> As good as this reduction was (especially in view of increasing Southeast Asia demands), it fell short of the \$.0261 goal set by the Operating Plan for that year.<sup>141</sup> The average mileage utilization increased in fiscal year 1967 by 1 percent. This represented approximately 3.7 million additional miles of vehicle fleet service during fiscal year 1966.<sup>142</sup> The Command

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<sup>138</sup> Memo from NAVFAC Hqs Code 104 to Code 10C of 22 Jun 1966, enclosure(1), "Annual Report to SECNAV," p. 7.

<sup>139</sup> NAVFAC Progress Report (FY 1967), pp. 6-7

<sup>140</sup> "Navy-wide Vehicle Maintenance Cost Trends and Goals" (chart), NAVFAC Operations and Maintenance, Code 1032B.

<sup>141</sup> NAVFAC Operating Plan 1-67 & 2-67, p. 28.

<sup>142</sup> NAVFAC Progress Report (FY 1967), pp. 6-7.

had better luck at reducing average vehicle age. From 4.6 years in fiscal year 1966, it dropped to 3.7 years in fiscal year 1967. This was only one-tenth of a year greater than the Operating Plan goal of 3.6 years.<sup>143</sup>

The Navy's total cost for operations and maintenance was the lowest of all the military services for the third consecutive year in fiscal year 1967.<sup>144</sup> Costs at mid-year were 1 percent lower than in 1966. An expected slight increase in operations costs was more than offset by an 8 percent reduction in maintenance costs.<sup>145</sup> This reduction and those for subsequent years, resulted from improved resources management control coupled with a program for the orderly replacement of high-cost overage vehicles.<sup>146</sup>

During fiscal year 1967, the Command continued to provide equipment support to Southeast Asia. The emphasis was again primarily on operations at ports, beaches and river surveillance bases in South Vietnam. This support still consisted mainly of trucks, construction equipment and heavy mobile equipment. Although this support was no longer of an emergency nature, there still

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<sup>143</sup>NAVFAC Operating Plan 1-67 & 2-67, p. 27.

<sup>144</sup>Ibid.

<sup>145</sup>Memo from NAVFAC Hqs Code 01 to Code 09 of 3 Jul 1967, enclosure (1), "Annual Report to SECNAV."

<sup>146</sup>Memo from NAVFAC Hqs Code 103 to 10C of 21 Jun 1966, enclosure (1), "Annual Report to SECNAV."



remained a continuing high priority need for additional equipment on short notice.<sup>147</sup>

During fiscal year 1968 the maintenance cost of administrative vehicles continued its downward trend. Unit cost per mile dropped from \$.0301 to \$.0297. This was still significantly higher than the \$.0260 mile that had been set by the Operating Plan for fiscal year 1968, but given the exigencies of the Vietnam war, inflation and other factors, this was the best that could be achieved.<sup>148</sup>

Unlike the cost reduction program, the age reduction program fulfilled its Operating Plan goal by lowering average vehicle age to 3.4 years in fiscal year 1968.<sup>149</sup> Gross mileage increased from 323 million miles to 330 million. Although unit vehicle costs were down the total cost of the program showed a slight increase, rising from \$9.7 million in fiscal year 1967, to \$9.8 million in fiscal year 1968. Until fiscal year 1967, the overall cost trend had been downward from a high of \$11.8 million in fiscal year 1961. Fiscal years 1965 and 1966 were the low point; only \$9.6 million was spent in each of these two years. Unfortunately the Command could not maintain this trend in the face of increased costs generated by the deepening United States involvement in Southeast Asia and the increasingly higher labor, parts and fuel costs that

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<sup>147</sup> Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967, enclosure (1), "Annual Report to SECNAV."

<sup>148</sup> NAVFAC Operating Plan 1-68, p. 30.

<sup>149</sup> Ibid.

resulted from inflation. Overall costs generally rose from fiscal year 1967 onward.<sup>150</sup>

Following a slight decline in fiscal year 1968, the cost of maintaining Navy administrative motor vehicles increased dramatically in fiscal year 1969. The cost per mile rose from \$.0297 to \$.0314. Considering that gross mileage actually declined that year from 330 to 328 million miles, this increase was all the more indicative of increasing costs. This cost increase made the target of \$.0260, set by Operating Plan 1-69, totally unrealistic.<sup>151</sup>

Severe funding problems plagued transportation during fiscal year 1969. Vehicle procurements for shore activities were cut to the extent that the actual replacement rate was 50 percent below that of eligible replacements, i.e., those pieces of equipment wearing out in fiscal year 1969. Constraints placed on the fiscal year 1970 budget submission and a subsequent mark-up by the Navy comptroller further aggravated the situation. The extent of the funding deficit for fiscal year 1969 was \$25.3 million.<sup>152</sup> The funding constraints on vehicle replacement effectively sabotaged the age reduction program. The average age of vehicles jumped

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<sup>150</sup>"Navy-wide Vehicle Maintenance Cost Travels and Goals" (chart), NAVFAC Operations and Maintenance, Code 1032B.

<sup>151</sup>NAVFAC Operating Plan 1-67, p. 28.

<sup>152</sup>MIC Problem Room Write up, FY 1969. Record Group 2, NAVFAC Archives, CBC, Port Hueneme.

from 3.4 years (FY 1968) to 4.4 years. This was one year greater than the Operating Plan target of 3.4 years.<sup>153</sup>

In fiscal year 1970, the average maintenance cost per mile per vehicle escalated sharply (from \$.0314 to \$.0350) and while total gross mileage decreased sharply (from 328 million to 303 million) costs continued to climb reaching \$10.6 million.<sup>154</sup> Budget problems continued to plague the Command during fiscal year 1970. As in fiscal year 1969, there was another funding deficit, this time of \$25.3 million dollars. The situation continued to deteriorate during fiscal year 1971.<sup>155</sup>

The average age of vehicles increased again in fiscal year 1970, rising to 5.1 years. Both fiscal year 1972 and fiscal year 1973 saw further dramatic increases in transportation maintenance costs. By fiscal year 1973, the average cost per mile for each vehicle had risen to \$.0645. The total annual cost had risen to \$14.2 million.<sup>156</sup> These increases were all the more staggering once it is realized that gross mileage driven during fiscal year 1973 was only 219 million, one-third less than the total for

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<sup>153</sup>"Navy-wide Vehicle Maintenance Cost Travels and Goals" (chart), NAVFAC Operations and Maintenance, Code 1032B; Operating Plan 1-67, p. 27.

<sup>154</sup>"Navy-wide Vehicle Maintenance Cost Travels and Goals" (chart), NAVFAC Operations and Maintenance, Code 1032B.

<sup>155</sup>MIC Problem Room Write-up, FY 1971. Record Group 2, NAVFAC Archives, CBC, Port Hueneme.

<sup>156</sup>Telecon with Mr. R. J. Whitmire, NAVFAC Operations and Maintenance, Code 102C.



fiscal year 1970.<sup>157</sup> These increases may be blamed partly upon inflation and partly upon steadily increasing vehicle age. From a low of 3.4 years in fiscal year 1968, the average age of each vehicle had crept up to 6.6 years by fiscal year 1973.<sup>158</sup> As older vehicles tend to require more maintenance, this age increase must be taken into account when attempting to explain cost increases. The age increase itself was a result of the funding constraints which characterized this period. Vehicle replacement could not be carried out as in previous years, thus the Navy was forced to retain vehicles which were increasingly prone to malfunction.

Fiscal year 1974 continued the trend. The average cost per mile increased to \$.0706. The only compensation was a drop in total annual cost amounting to \$1.5 million. The average vehicle age also increased, rising to 6.7 years. As the inflation rate continued to spiral, and as all costs, especially fuel costs continued to increase, this cost decline could only be attributed to another sharp decrease in vehicle usage.

During fiscal year 1974 gross mileage driven dropped from 219 million miles to 180 million. This was in response to various energy conservation programs. Given contemporary economic conditions, there was little chance that present cost trends would reverse themselves in the foreseeable future.<sup>159</sup>

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<sup>157</sup>Telecon with Mr. R. J. Whitmire, NAVFAC Operations and Maintenance, Code 102C.

<sup>158</sup>"Navy-wide Vehicle Maintenance Cost Travels and Goals" (chart), NAVFAC Operations and Maintenance, Code 1032B.

<sup>159</sup>Ibid.

CHART 11-4

## NAVY-WIDE VEHICLE MAINTENANCE COST TRENDS

Fiscal Year	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Total annual cost (mil. \$)	9.63	9.63	9.72	9.80	10.30	10.60	11.20	12.30	14.20	12.70
Unit cost per year (\$)	321	318	314	308	322	343	372	450	559	575
Cost per mile (\$)	.0324	.0308	.0301	.0297	.0314	.0350	.0386	.0482	.0645	.0706
Average age (yrs.)	4.6	4.1	3.7	3.4	4.4	5.1	5.5	6.0	6.6	6.7
Gross miles (mil.)	295	312	323	330	328	303	290	255	219	180
Average milage per unit	9,845	10,320	10,457	10,390	10,269	9,806	9,639	9,347	8,657	8,137

## PUBLIC WORKS

To increase efficiency and reduce the cost of providing public works service, plans were completed during fiscal year 1965 for the establishment of Public Works Centers at Great Lakes, Illinois, Pensacola, Florida, and Yokosuka, Japan. The centers, which were to serve the naval complexes at these locations were established on 1 July 1965. Prior to these consolidations, each major command operated its own public works department.

The mission of the Public Works Center was to provide public works, public utilities, public housing, engineering services, shore facilities planning support, and all other related public works logistics support required by operating forces, dependent activities and other commands located in the vicinity of the naval complex served by each center.

These consolidations resulted in a better utilization of both equipment and personnel and made possible increased savings and improved service.<sup>160</sup> (Typical of the sort of savings achieved, was the \$119,000 saved by the Great Lakes complex during its first year of operation). These savings resulted from reductions in maintenance, utilities and personnel costs. The funds saved were reprogrammed to other activities to decrease their backlogs of essential maintenance.<sup>161</sup>

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<sup>160</sup>BUDOCKS Progress Report (FY 1965).

<sup>161</sup>Memo from NAVFAC Hqs Code 10C to Distribution List of 6 Jun 1967, enclosure (2), "Annual Report to SECNAV."



By fiscal year 1966, the three new Public Works Centers had produced a savings of \$974,744. During fiscal year 1967 ten other naval complexes were studied for possible consolidation of public works functions.<sup>162</sup> However, because of the exigencies of the Vietnam war as well as other factors, no further Public Works Centers were established until 1974. Two were even disestablished in the interim.

During fiscal year 1967, the ten Public Works Centers and the Public Works Transportation Center, Treasure Island, performed a total workload approximating \$135.5 million for 83 major customers and a larger number of minor customers. The value of this workload equaled 37 percent of the total public works operation and maintenance dollars available to the Navy in fiscal year 1967.<sup>163</sup>

At the Public Works Center, San Diego, an automated Public Works Management System was installed on a trial basis. The results were favorable and the systems were subsequently installed at other Public Works Centers. Improvements in the management of Public Works Centers and further cost reductions were the result.<sup>164</sup>

The Public Works Centers at Great Lakes and Pensacola were converted from appropriation accounting, to Navy Industrial Fund

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<sup>162</sup>NAVFAC Progress Report (FY 1966), p. 22.

<sup>163</sup>NAVFAC Progress Report (FY 1967), p. 7

<sup>164</sup>Ibid.

accounting, thereby bringing the total number of Navy Industrial Fund activities under the Command's supervision to nine.<sup>165</sup>

Detailed studies recommending consolidation of public works functions and establishment of new Public Works Center or Public Works Lead Activities (PWLAs) were completed at Boston, Massachusetts; Philadelphia, Pennsylvania; and Jacksonville and Key West, Florida. But, as touched upon above, nothing came of these studies.<sup>166</sup>

In fiscal year 1967, the Command initiated the Model Public Works Program. The purpose of this program was to recognize excellence and thus provide incentive for the improvement of public works functions. Recognition for outstanding performance was provided by naming the activity involved a "Model Public Works Activity." All stations with 150 or more personnel in their public works departments were eligible. The Command and its Engineering Field Divisions developed the criteria for model status based upon management and technical reports and engineering requirements. The Engineering Field Division was responsible for helping activities straighten out their public works operations so that they might be eligible for nomination. It then made the nominations and the Command made the final choices.

The Model Public Works Program concept was good and the program functioned well until 1973 when budget restrictions forced its

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<sup>165</sup>NAVFAC Progress Report (FY 1967), p. 7.

<sup>166</sup>Ibid.

cancellation. The Engineering Field Divisions simply no longer had sufficient resources to provide further Model Public Works Program support.<sup>167</sup>

During fiscal year 1967, a study on the productivity and efficiency of Public Works Center (using the Public Works Center, Norfolk, Virginia as an example) was completed. A survey of costs at Norfolk for the period 1962-1967 showed increased effectiveness and economy in spite of rising labor, fuel and material costs. This survey included an analysis of actual overhead levied on customers. The cost of \$1.59 per man-hour of maintenance was compared to the audited rate for the same functions as accomplished by a team under Commandant, Fifth Naval District for the period October-November 1966. The team's rate was \$1.89 for the hourly overhead rate for maintenance work performed. As is apparent the Public Works Center yielded a substantially lower overhead rate.<sup>168</sup>

The performance of the Public Works Center, Norfolk, was not unusual. All Public Works Centers were providing services more economically and effectively than most individual public works departments. All had potential for further improvement because all possessed the capabilities necessary for the most effective accomplishment of public works services: true costs identifiable through Navy Industrial Fund Accounting, greater flexibility due

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<sup>167</sup> Lewis telecon.

<sup>168</sup> Memo to CAPT J. H. King (from Public Works Center, Norfolk) of 21 Aug 1967.



to a broader base of skilled labor and specialized equipment, and better and more experienced supervision.<sup>169</sup>

The high overhead cost resulting from duplication of facilities in each Command's public works department was eliminated by these considerations. Fewer shop buildings, integrated utility systems, uniform accounting and reporting and uniform management systems resulted in substantial savings of operational and maintenance dollars. By 1970, the consolidation of public works into ten Public Works Centers, was saving the Navy \$21.5 million annually. This was approximately 13 percent of the annual public works cost at these complexes.<sup>170</sup>

During the post-Vietnam era, funding restraints forced the Command to reassess and reorganize many of its activities so that overall performance could be maintained even with reduced budgets. This action can be largely held responsible for the disestablishment of two Public Works Centers during the 1970s.

As the result of the tense military situation and the base phase-down, the Public Works Center, Guantanamo Bay, was disestablished as a command on 1 July 1971. It subsequently became a Public Works Department under the command of the U.S. Naval Station, Guantanamo.<sup>171</sup>

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<sup>169</sup> Memo from Public Works Center, Norfolk to CAPT J. H. King.

<sup>170</sup> Memo from NAVFAC Hqs Code 105 to Code 10 of 4 Mar 1975, enclosure (2), "Public Works Center: A briefing for the Naval Inspector General" (21 Apr 1970).

<sup>171</sup> Command History, U.S. Navy Public Works Center, United States Naval Base, Guantanamo Bay, Cuba, 1 January-30 June 1971, p. 2.

As part of a shore establishment realignment program, the Public Works Center, Newport, Rhode Island, was disestablished as a command on 30 June 1974. The Public Works Center, along with several other naval base commands, merged with the Naval Officer Training Center, Newport, adding to that Command's training mission those of public works, supply, base security and fire protection, and station support and services.<sup>172</sup>

Despite budget limitations the public works consolidation program continued. The most recent example of such consolidation was the establishment of the Navy Public Works Center, San Francisco on 1 July 1974. This facility consolidated numerous Navy public works and maintenance operations in the east San Francisco Bay area.<sup>173</sup>

After the establishment of this Center the Command operated a total of nine Public Works Centers, (located at Great Lakes, Guam, Norfolk, Pearl Harbor, Pensacola, San Diego, Subic Bay, Yokosuka, and San Francisco).

In recent years the environment has been a major concern of all naval activities, including Public Works Centers. What has the Command accomplished in environmental protection between 1965 and 1974?

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<sup>172</sup> Command History of the Navy Public Works Center, Newport, Rhode Island for FY 1973, p. 7.

<sup>173</sup> Ltr from COMNAVFAC to Distribution List of 21 Mar 1974, subj: Navy Public Works Center, San Francisco; establishment of, enclosure (1).

## THE ENVIRONMENTAL PROGRAM

The Navy is the only federal agency with large scale operations in all environmental areas (land, sea and air). Therefore pollution and the environmental regulations and standards enacted to prevent, control, or eliminate it, has a much greater impact on the Navy than on any other federal agency.

The Naval Facilities Engineering Command has had Navy-wide shore responsibilities for environmental programs since fiscal year 1966. In the Operating Plan for that year the Command was specifically tasked under Goal II of Program IX: "To develop pollution programs." From this simple program goal target, a whole range of comprehensive pollution control programs was ultimately developed.<sup>174</sup>

Significant progress was made during fiscal year 1966 in implementing the Navy's pollution abatement program ashore. The Command identified most of the Navy's water pollution deficiencies and worked with other agencies to develop standards for air pollution control.<sup>175</sup>

In fiscal year 1967 a five year plan to clean up air pollution emanating from naval shore installations was prepared for submittal to the Bureau of the Budget and the Department of Health, Education and Welfare. The plan called for \$87 million to be spent on construction of such items as refuse incinerators, smoke elimination facilities for fire fighting schools, boiler fuel conversions, industrial fume

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<sup>174</sup> NAVFAC Operating Plan 1-66, p. 34.

<sup>175</sup> NAVFAC Progress Report (FY 1966), p. 22.



control and air pollution control devices such as electrostatic precipitators and mechanical dust collectors. Fiscal year 1969 was designated the first year for Air Pollution Control Military Construction Projects.<sup>176</sup> In the area of water pollution control, the first year of the five year Military Construction Program (fiscal year 1968), consisting of thirty items at a cost of \$23.6 million, was submitted to Congress for approval during fiscal year 1967.<sup>177</sup> The fiscal year 1969 Military Construction Program for pollution abatement was also assembled during fiscal year 1967. It totaled \$24.8 million and was the first program containing both water and air pollution control projects (twenty-seven water control projects and nineteen air pollution control projects).<sup>178</sup>

An important aspect of naval construction during the 1970s was the construction of high priority pollution abatement projects. Several hundred projects were completed in order to correct various kinds of pollution violations. Special categories were established within the Military Construction Program for water, air and noise pollution abatement in compliance with corresponding Executive Orders.<sup>179</sup>

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<sup>176</sup> NAVFAC Progress Report (Fy 1967), p. 8.

<sup>177</sup> Ibid.

<sup>178</sup> Ibid.

<sup>179</sup> Draft report from Mr. H. W. Cole, NAVFAC Operations and Maintenance, Code 1041C, of 22 Mar 1974, p. 6.

During the last few years many advances were made in pollution abatement techniques. As national attention increasingly focused upon pollution problems during the early 1970s, the Navy diverted more and more of its resources into pollution abatement programs.

When originally formulated these programs were only responsible for corrective projects and engineering support in air, water, and land pollution control. They have since been expanded to include noise pollution control at shore activities and oil spill control and cleanup in inland areas, harbors, and ports. The Command also developed and managed an environmental information and service system in support of these related programs, originally called the Navy Environmental Protection Data Base (NEPDB) System.<sup>180</sup>

The research and development for this system began on 1 July 1971 and it became operational on 1 July 1973. The Navy Environmental Protection Data Base System was a centrally managed, regionally implemented service which collected, processed and disseminated data to support the Navy Environmental Quality Program and to assure compliance with Navy, federal, state and local environmental quality standards. Strict national laws and federal mandates to provide nationwide leadership for the protection and enhancement of the environment were generating factors for this system. A change in the name to "Naval Environmental Protection Support Service (NEPSS)" was necessitated by a broadening of the program's scope. The

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<sup>180</sup>"Pollution Abatement at Naval Shore Activities" (undated draft), NAVFAC Operations and Maintenance, Code 104A.

operational concept of the service included identification and quantification of Navy pollution sources to assure compliance. The NEPSS analyzed environmental data and trends, evaluated new instrumentation methods of sampling and data analysis, collected ambient data as required, and provided reliable and accessible environmental information.<sup>181</sup>

This service provided information on National Pollutant Discharge Elimination System (NPDES) permit requirements. Each activity was required by public law to obtain discharge permits and to monitor all polluting effluents released into the waterways. The Naval Environment Protection Support Service, working through the Regional Environmental Support Offices (RESOs) of the Engineering Field Divisions, helped to fulfill this requirement.<sup>182</sup>

In fiscal year 1966, the Navy began updating its programs to bring its facilities into compliance with local, regional and state water pollution abatement regulations. The goal of this updating was the elimination of pollutant discharges into waterways. In addition, the Command developed projects to eliminate pollutant discharges from sanitary and industrial sources in compliance with the Federal Water Pollution Control Act of 1973 (P.L. 92-500).<sup>183</sup>

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<sup>181</sup>"Navy Environmental Protection Data Base System (NEPDBS)," NAVFAC Operations and Maintenance, Code 1023.

<sup>182</sup>"Pollution Abatement at Naval Shore Activities" (undated draft), NAVFAC Operations and Maintenance, Code 104A.

<sup>183</sup>Ibid., p. 5.



An important aspect of water pollution abatement was waste water control. In 1966, responding to Executive Order 11258, the Navy began a program to improve waste water discharges from its shore establishments and to enhance and protect the quality of the nation's water. Before the beginning of the program, Navy bases, where feasible, habitually connected their waste water lines to those of local communities and made use of their waste disposal systems instead of constructing their own. Under the new abatement program, the Navy and the local community cooperated in jointly operating a larger treatment facility. This practice not only reduced the load on the municipal system but also produced cost savings for both the community and the Navy.<sup>184</sup> The expansion and improvement of on-base facilities was a natural concomitant of cooperation with the local community.

Initial construction efforts to abate water pollution involved improvements to sewage treatment plants, extension of collection systems and separation of storm and sanitary sewer lines. At the Naval Base, Pearl Harbor, this resulted in approximately \$12 million of major improvements to Navy facilities. At the Naval Base, Charleston, South Carolina, a large storm and sanitary sewer separation project was completed and sewage was subsequently pumped into a nearby expanded municipal plant. In other cases septic tanks were bypassed as buildings were connected to extended sewer

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<sup>184</sup>"Annual Status Report, DOD Environmental Program Input" (18 Mar 1974), p. 3.

lines and various improvement were made to treatment plants. Another major area of construction concerned the building of industrial waste treatment plants. Industrial operations (including metal plating, paint stripping, etc.) carried out in shipyards and at rework facilities produced waste waters containing metallic concentrations which required special treatment to meet effluent quality standards. These industrial waste treatment plants were in operation at various locations.<sup>185</sup>

The installation of ship waste water collection systems was a major construction effort during the 1970s. These pier sewer lines serviced berthed ships equipped with collection and transfer systems. Such installations eliminated the practice of discharging raw sewage into harbor waters. Collection and transfer systems were installed at approximately thirty different activities. Construction of pier sewers continued, with approximately \$20 million spent yearly. The whole project was scheduled to take five years. The first of these sewers went into service in fiscal year 1975.<sup>186</sup>

Projects were also developed for the collection, treatment and reclamation of oily wastes. These projects were unique to fuel depot installations, and served the dual purpose of reducing oil contamination of harbor water and maximizing oil recovery for energy savings purposes. Construction included pipelines, storage tanks

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<sup>185</sup>Report draft from Mr. H. W. Cole, NAVFAC Operations and Maintenance, Code 1041C, p. 7.

<sup>186</sup>Ibid.

and oil-water separation equipment. These projects were under design for San Diego, Pearl Harbor, and Norfolk; others followed at other major naval complexes.<sup>187</sup>

Another potential environmental hazard in harbors and inshore waters was dredging. The Navy monitored the impact of its maintenance dredging program on the marine environment in accordance with Environmental Protection Agency and regional requirements. Dredging operations were particularly sensitive because of dredged material disposal problems. A project was developed in the San Francisco Bay area for the disposal of dredged material. It called for a spoil collection trap in San Pablo Bay, a pipeline with pumps to discharge the spoil ashore, and dikes to restrain the material on Navy property. The facility would provide a fifteen year disposal capacity for dredged materials from Navy installations in the San Francisco Bay Area.<sup>188</sup>

Air pollution was a major Navy concern during these years. Initial construction for air pollution abatement projects generally involved controls on Navy incinerators. Heat recovery features were incorporated where economically feasible, as in the case of incinerating plants at the Naval Station and the Naval Shipyard, Norfolk. At both locations, a large quantity of burnable refuse was available and a demand existed for supplemental steam. Both

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<sup>187</sup> Cole report draft; NESO Report 20.1-001, p. 11; NAVFAC ltr of 12 Mar 1974, subj: Oily Waste Collection & Reclamation.

<sup>188</sup> NESO Report 20.1-001, p. 5.



projects included pollution abatement devices to assure that stack emissions met air quality standards. Special incinerators and a hydropulper were provided to dispose of classified material. Electrostatic precipitators and scrubbers were installed at many heating and electrical generating plants to assure compliance with air quality emission standards.<sup>189</sup>

Control of air emissions from heating and power plants was an integral part of the Navy Boiler Tune-Up Program. This program had the dual purpose of reducing air pollution and conserving fuel. Both of these goals were achieved through the optimum operation of stationary boilers.<sup>190</sup>

Navy fire fighting schools fulfilled a critical shore training requirement. Smoke from these operations was both a nuisance and an air contaminant to the surrounding area. After-burner systems were constructed to divert smoke from training structures through a combustion chamber so that stack emissions met air quality standards. A smoke-free fire was also developed through the use of a waterspray system. Such a system was particularly effective in open tank fires, and was installed at Great Lakes, Philadelphia and Norfolk.<sup>191</sup>

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<sup>189</sup> NESO Report 20.1-001, p. 5

<sup>190</sup> Pollution Abatement at Naval Shore Activities (undated draft), NAVFAC Operations and Maintenance, Code 104A.

<sup>191</sup> Ibid.

Fire was not the only cause of air pollution, many common industrial processes also generated hazardous airborne residues. Major construction was carried out to improve the Navy's sand-blast and metal preparation facilities at Norfolk, San Diego, Mare Island, North Island, Pearl Harbor, Long Beach, Bremerton, and Charleston. These improvements were necessary to protect both the workers and the surrounding communities from hazardous emissions.<sup>192</sup>

In the 1970s the Command became involved with the abatement of a newly recognized form of pollution - excessive noise. Increased emphasis was placed on the reduction of high noise levels. Navy and Marine Corps air installations had the problem of reducing the noise from increasingly more powerful jet engines to tolerable levels for both military personnel and the surrounding communities. Close-coupled sound suppressors were installed at several locations where ground testing regularly takes place. These suppressors included cooling water systems which resulted in the emission of plumes carrying particulates from the exhaust stack. Unfortunately, this system abated sound at the cost of increased air pollution. A dry noise suppressor system was constructed at Miramar, California. The aircraft being tested was entirely enclosed; supplemental air was used for cooling to eliminate the water plume, and an augments tube was used to reduce the sound level from the jet engine exhaust to acceptable levels. The new acoustical enclosure at Miramar was

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<sup>192</sup> NESO Report 20.1-001, p. 5.

closely evaluated as it appeared to have wide application for noise abatement at other military installations.<sup>193</sup>

A subject that involved the pollution of several media was the disposal of waste ordnance. The past practice of open burning as a means of disposal was rejected by the Environmental Protection Agency. Disposal at sea was not only subjected to critical review because of its associated hazards, but also eliminated a valuable ship (since it was sunk with the waste ordnance on board). In addition, demilitarization (destruction of an item's military potential) by the conventional means of steam and high pressure water, created water pollution problems. To overcome these difficulties, construction of the Demilitarization Facility at Hawthorne, Nevada, with significant pollution controls was begun. Here ammunition that was designated as either obsolete, or unserviceable due to prolonged storage, or rejected during production, would be demilitarized. Estimates indicated that the facility would generate over \$5 million annually, from the recycle/resale of the materials, to be returned to the U.S. Treasury.<sup>194</sup>

During the 1970s, watershed protection and improvement plans were implemented on most lands under Navy control. All of the Navy's land will be covered under these plans within the next few years. In addition, other minor projects will be carried out in

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<sup>193</sup>NESO Report 20.1-001, p. 5.

<sup>194</sup>See Chapter 10 for a complete discussion of the Hawthorne facility.



order to eliminate erosion problems. In the development of erosion controls and other programs of mutual interests, the Navy obtained assistance from and coordinated its activity with the U.S. Department of Agriculture.<sup>195</sup> For major store stabilization studies, the Navy coordinated its actions with the U.S. Army Coastal Engineering Research Center.<sup>196</sup> During fiscal year 1974, \$160,000 was funded for the soil conservation program. Funds were used primarily for field training, studies and plans for building erosion control into construction, plans for watershed protection, and the correction of existing deficiencies.<sup>197</sup>

The Applied Biology Program, established in 1953, became a part of the newly created Environmental Quality Division in July 1974. Program guidance to the field and training were provided by twenty professional entomologists in the NAVFAC family. Since 1965 approximately 20,000 professionalman-days have been spent in on-site program reviews, on-the-job training, and formal recertification training of subprofessionals. A survey in 1975 disclosed that over 750 individuals were directly involved in pest control on Navy property. Of these, 500 operators and supervisors were trained and certified. Since 1965, these operators and supervisors have

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<sup>195</sup>Ltr from CNM to CNO of 18 Mar 1974, enclosure (1), "NAVMAT Inputs for Annual Status Report DOD Environmental Program" (11 Mar 1974).

<sup>196</sup>Ibid.

<sup>197</sup>Ibid.

spent approximately 100,000 man-hours in their biennial recertification training. In 1959 a correspondence course (Basic Pest Control Technology Course Number 150) was developed at Atlantic Division. Since then, over four thousand copies have been distributed for use.

The applied Biology Trainee Program graduated seven applied biology trainees who were subsequently employed in the field divisions. The scarcity of entomologists at this time demonstrated the value of the trainee program.<sup>198</sup> Also in the field of applied biology, three new military handbooks concerning the conservation of materials and structures were completed and distributed.<sup>199</sup>

In 1969 there was developed an effective program for automatic processing of reportable data on pest control operations. Used by the Navy and Marine Corps, the program was also adopted by the Army. This permitted effective management of the data and of the Applied Biology Program. Reporting and professional review of pest control operations were finally simplified. Since 1965 approximately 24,000 activity reports covering a million separate operations using ten million man-hours and fifteen hundred tons of pesticides costing \$150 million were completed.

In 1972, Public Law 92-516, the Federal Environmental Pesticides Control Act, was passed. This law, and the Environmental Protection Agency interpretations, required some subtle but definite

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<sup>198</sup> Memo from NAVFAC Hqs Code 101 to Code 10C of 23 Jun 1966, enclosure(1), "Maintenance Division Data," p. 3.

<sup>199</sup> Ibid.

changes in the Applied Biology Program as managed by the Command. Training and certification examinations were changed to meet EPA-standardized categorization of subject matter for certification. Because the requirement for training and certification was made a national law, it had to extend beyond public works shops personnel to include others such as lease holders and non-appropriated funded activities and public housing. Such training as required for all personnel who applied restricted-use pesticides was provided. All such operations were recorded and reported.

One facet of the pollution abatement program was the safe disposal of hazardous materials. Disposal procedures that were not ecologically harmful were developed by the Navy and were constantly updated to reflect the latest requirements. Radiological material is one of the most dangerous and potentially harmful materials that must be disposed of. The Navy and the Command were aware of their responsibility for the safe use of nuclear power systems under the Nuclear Shore Systems Program for both nuclear power reactors and radioisotope power generators. If not properly monitored and controlled, these systems could pose a serious threat to the atmosphere and waters. Since 1974 the Command has had no functioning shore power reactors under its cognizance. The only such reactor operated by the Command was located at McMurdo Sound, Antarctica. This reactor was shut down in 1974 for reasons of cost effectiveness.<sup>200</sup>

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<sup>200</sup>Ltr from CNM to CNO of 18 Mar 1974, enclosure (1), "NAVMAT Inputs for Annual Status Report DOD Environmental Programs" (1 Mar 1974), p. 10.



Radiological pollution control calls for the use of the latest filtration techniques in order to maintain gaseous radioactivity released to the atmosphere within the parameters set by Federal Energy Administration regulations. Such precautions are absolutely necessary if injury to both the environment and to naval personnel is to be avoided. Air pollution is also controlled by proper nuclear power generator design and by safety evaluations of the completed generator and its ancillary equipment in order to assure compliance with national and international regulations concerning the safe use of nuclear power systems.<sup>201</sup>

Radiological water pollution, like radiological air pollution, is controlled by filtration, as well as by dilution. The discharge of liquid effluents to the environment is then monitored to comply with Federal Energy Administration regulations. The same design and inspection factors that were mentioned above also played an important role in preventing radiological water pollution.<sup>202</sup>

Land pollution with respect to nuclear power reactors ashore is controlled by off-site shipment of radioactive solid wastes for ultimate disposal in approved land burial sites in accordance to Federal Energy Administration regulations.<sup>203</sup>

The annual funding level for the Naval Construction Pollution Abatement Program was approximately \$55 million and comprised about

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<sup>201</sup>Ltr from CNM to CNO of 18 Mar 1974.

<sup>202</sup>Ibid.

<sup>203</sup>Ibid.

sixty individual projects. The emphasis within the water, air and noise categories changed continually to meet the specific environmental requirements of the given moment. Environmental considerations became a way of life insofar as construction was concerned. Pollution abatement projects have become a significant and challenging part of naval construction.<sup>204</sup>

#### THE MINOR CONSTRUCTION PROGRAM

Minor construction (including alteration) projects, costing between \$10,000 and \$25,000 were funded from operations and maintenance appropriations. These projects were limited to requirements of an operational nature, and in this cost range were not eligible for the Military Construction Program.<sup>205</sup>

This program was originally assigned to the Bureau of Yards and Docks on 1 July 1963, as a single executive function. The realignment of support shore activities, coupled with the institution of the Resources Management System, caused the Chief of Naval Operations to revise procedures for the management of minor construction. Effective 1 July 1966, the Naval Facilities Engineering Command transferred all minor construction approval and funding authority to the sponsor bureaus, offices and commands. Concomitant with this action the Chief of Naval Operations published revised

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<sup>204</sup> Ltr from CNM to CNO of 18 Mar 1974.

<sup>205</sup> NAVFAC Progress Report (FY 1967), p. 8.

procedures for the execution of the Minor Construction Program. Henceforward, the Command, acting as the Chief of Naval Operation's agent, approved or disapproved projects from the engineering, statutory, and regulatory viewpoint. Resource operating targets were assigned to the Command's representatives serving major claimants. The major claimants then decide on execution.<sup>206</sup>

The Minor Construction Program budget remained relatively stable between 1965 and 1975. A total of \$8.4 million was spent in fiscal year 1965 and a total of \$10 million in fiscal year 1975. The Vietnamese years saw an expenditure increase of about one-third until fiscal year 1969, when \$15.7 million was spent. By fiscal year 1970 this had declined to \$10.3 million. Fiscal year 1971 saw a very slight increase to \$10.4 million. Fiscal years 1972, 1973 and 1974, witnessed substantial increases which reached a highpoint in fiscal year 1973 when \$14.8 million was spent. This expenditure dropped sharply in fiscal year 1974 to only \$11.7 million.<sup>207</sup>

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<sup>206</sup> Memo from NAVFAC Hqs Code 10 to Code 09 of 3 Jul 1967, subj: Annual Report to SECNAV.

<sup>207</sup> "Facilities Maintenance O&MN & OMNR" (chart), NAVFAC Operations and Maintenance, Code 10BB.